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VIEWS, NEWS AND INTERVIEWS.

An electrical engineer who was wiring a theatre in a great hurry was considerably bothered by the carpenters who insisted on driving nails in his wires and cutting the circuits whenever they found it necessary. So he rigged up a 12-inch fire gong and connected all his circuits with it. About half an hour after the gong was installed it went off with a clanging, which brought every workman in the building down to the street. Some of them yelled "Fire!" and all were scared. The engineer got them together and back into the building. Then he explained that every time any one but his own men even so much as touched a wire that gong would go off, and the man who touched the wire would get a shock of electricity that would paralyze him for life. The engineer had no more trouble after this.

It is stated that a Russian company has been formed to develop electric power from the celebrated waterfall at Matra, Finland. It is estimated that 20,000 horse-power is available, and the scheme is to transmit current to tourist resorts in the vicinity.

"Little Christopher" was played at the Van Curler Opera House in Schenectady, N. Y., last week. The comedian, known to fame as Willie Collier, takes the part of Herrmann the magician, and does a few burlesque feats of prestidigitation. In one of the tricks Collier steps to the footlights and says blandly and persuasively: "Will some one in the audience kindly loan me an egg?" Now, a man connected with the General Electric Company had seen the show in Chicago, and when he went to see it again in Schenectady he took two friends along with him—also several eggs. They sat in the fifth row, and when Collier made his request for eggs, he got 'em—two in the neck and one in his hands. He looked a little sad, dazed and eggy, but completed the trick, all the while keeping an anxious eye on the three men who answered his request so promptly. When he went off the stage Collier called for the manager of the house and insisted on having the three men ejected, notwithstanding that their action impressed the audience as the hit of the show. The manager declined to put them out on the ground that they had simply fulfilled Mr. Collier's request — he asked for eggs and got them.

The 1895 report of the Electrical Subway Commission of Brooklyn, N. Y., states that there are 20,371 miles of electrical conduits in that city, of which 3,599 were laid during the past year.

"I was a stockholder in the first railroad ever built in Oregon," said a veteran Wall street man to a *Sun* reporter, "and it was a snap. The road was a street in Portland. It was built in 1861, and road, rolling stock and mules cost only a little more than $20,000. It was a mile long, and every man, woman and child that rode that mile had to come down with 25 cents. There were only six stockholders, and the first year we paid for the road and divided nearly $50,000 in profits. We didn't know what a good thing we had, and when in 1864 Ben Holliday offered us $200,000 for it, cash, we, like fools, went and sold it to him. I wish I had it now!"

Rumors about the Brush Electric Company.

Recent rumors have been in circulation to the effect that the Brush Electric Company, of Cleveland, O., was going out of business. A representative of the ELECTRICAL REVIEW saw Mr. C. G. Smedberg, second vice-president, secretary and treasurer of the Brush company, in Cleveland last week and asked him this question:

"Is the rumor true that the Brush Electric Company is going to close its Cleveland plant and merge its business with the General Electric Company at Schenectady, N. Y.?"

"There is absolutely no foundation for such an assertion," said Mr. Smedberg, "at least so far as I know, and I am sure I should be among the earliest to be informed of such plans. Time will prove that the rumor is untrue."

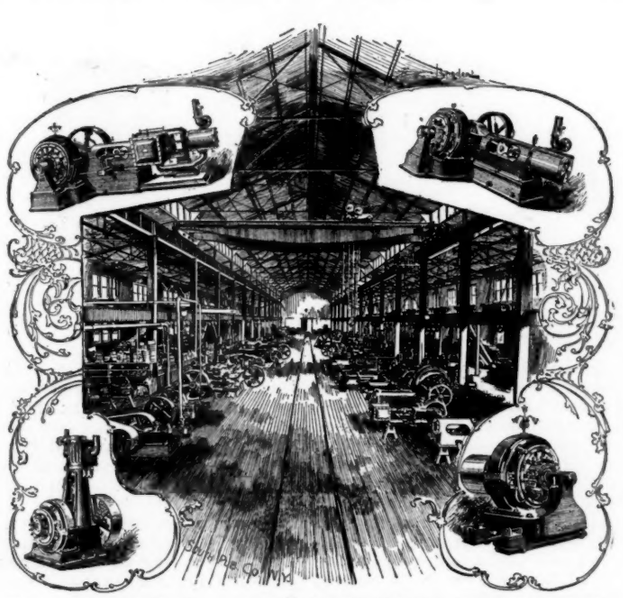


FIG. 1.—INTERIOR VIEW OF THE J. H. MCEWEN MANUFACTURING COMPANY'S MACHINE SHOP.

Improvements in Engine and Dynamo Building.

The J. H. McEwen Manufacturing Company, of 26 Cortlandt street, New York, the well-known builders of automatic engines, have entered the electrical field and are building dynamo electric machinery in connection with their engine business.

Their high-speed engines, which have been in market for about four years, have gained an enviable reputation as high-grade engines. They claim that for direct-connected apparatus much better results can be obtained when both engine and dynamo are built by the same company, assembled and thoroughly tested before leaving the works. Then again all parts can be standardized and made duplicate, and can be turned out at less cost than it is possible when the engine is built by one company and the dynamo by another in widely different localities. The complete machine, having been thoroughly tested at the works, insures quick and satisfactory starting when it reaches its destination. This feature will be appreciated by those who have had experience in this line.

The company has a large and modern plant well equipped with special tools, electric traveling, hydraulic jib cranes, hydraulic lifts, etc.

Railroad sidings extend through the center of the main building so that all heavy material, etc., is handled by power cranes. Their facilities are such that first-class work can be turned out at a reasonable cost.

Fig. 1 shows an interior view of their machine shop, a steel structure built by the Shiffler Bridge Company, of Pittsburgh, Pa. The central part, 60 feet wide, is spanned by a 20-ton electric traveling crane, having 30 feet clear head room, and runs the entire length of this room, which is 260 feet. Within this area all the heavy machines are located. On either side is a wing 30x260 feet long, the second floors or galleries of which are equipped with light tools, vise benches, etc.

This company has made some recent improvements in the details of

their engines, notably in the governor and cross head. Fig. 2 is a cut of their governor, which is extremely simple, having but one bearing, and that a roller pin bearing, which requires no lubrication, so that the want of lubrication will not affect its regulation, and as the spring is the only part that is adjustable, there can not be any trouble from misadjustment. The engine must regulate nicely, as the builders state they have given the following guarantee with every engine that they have sold, and have in no case failed to meet it:

Guarantee.—The engine shall not run one revolution slower when fully loaded than when running empty, and a reduction of boiler pressure from the greatest to that necessary to do the work will not reduce the speed of the engine one revolution. Any engine failing to meet this guarantee becomes the property of the purchaser, upon the payment of one dollar.

Figs. 3 and 4 show the construction of their cross-head. The shoes are held in position by eccentric bolts. To adjust position of shoes for wear it is only necessary to loosen nut and turn the eccentric bolt to such an extent as is necessary to give proper adjustment. Then tighten nut, and it will remain in that position. It will be noticed that shoes swivel on the eccentric bolts, so that it is impossible for shoes to have anything but a full bearing. Both upper and lower guides, as well as cross-head pin, are oiled from stationary sight-feed oil cup on top of frame. The oil is wiped off by upper shoe, and is caught in oil groove shown, extending across face of shoe, and led through oil holes at each end of grooves to inside of upper shoe; thence to a funnel-shaped oil hole in strap of cross-head box to cross-head pin; from there it drops to lower shoe, and then through holes in this shoe to lower guide.

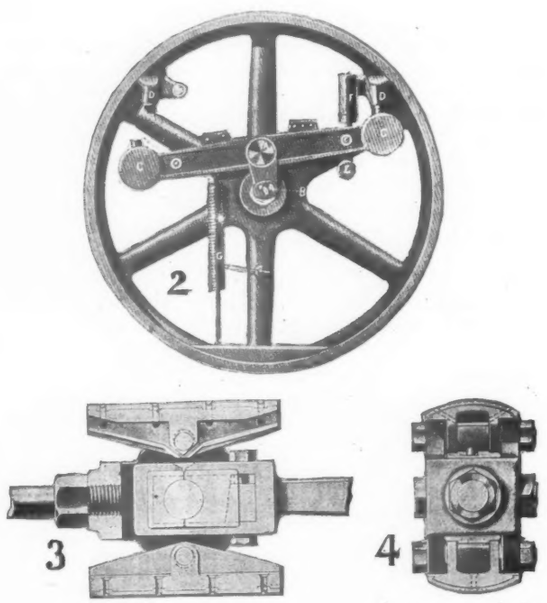
The shoes are faced with genuine babbitt, which is put on in such a manner that it is as solid as though it was part of the shoe itself.

The Thompson-Ryan dynamo represents a radical departure from the beaten tracks of dynamo design, differing in nearly every detail of construction from the ordinary type of machine. The most important feature is a set of series windings surrounding the armature and termed balancing coils. This feature, which is the invention of Prof. Harris J. Ryan, of Cornell University, was introduced for the purpose of balancing armature reaction, and carefully conducted scientific tests show that it accomplishes the desired end perfectly. Having no armature reaction to contend with, the designers of the Thompson-Ryan dynamo have been able to introduce into their designs many important features never before possible.

At first thought it would seem that the addition of balancing coils to a dynamo would complicate the construction to a certain extent, and so it would if applied to the ordinary type. But all this is fully offset by the simplification of the machine in other respects. The field castings of these machines are of steel and consist of but three pieces, which are held together by four bolts. One of these castings is the "pole ring," shown in Fig. 5, through which the balancing coils are wound, and the other two constitute the field ring proper, Fig. 7.

The balancing coils are wound in such a way that the current passes through them across the pole face in the opposite direction from the currents in the armature conductors, and thus the magnetic effects of the armature currents are neutralized.

Fig. 6 is a view of the completed pole ring. The field ring, Fig. 7, shows on its internal periphery the "pole necks," around which the coils are placed. It will be seen that the field ring is of such a shape as to entirely enclose the field coils, thus thoroughly protecting them from mechanical injury. It will be noted also that the space in the field ring allowed for the field coils is unusually small. This arises from the fact that less than one-fourth as much energy is required to magnetize the fields of this dynamo as is necessary for a machine of equal capacity of ordinary design. On account of the very small amount of field energy required the rise in temperature of the field coils is very slight, notwithstanding the fact that these coils are so nearly surrounded on all sides. No compound winding is used on these dynamos, since the balancing coils afford a compounding vastly more effective than the compound coils of the ordinary dynamo.



FIGS. 2, 3 AND 4.—GOVERNOR AND DETAILS OF CROSS HEAD, MCEWEN ENGINE.

All of the armatures for the Thompson-Ryan dynamos, of whatever capacity and whether wire wound or bar wound, are constructed on the same general style. The cores are built of thin plates of a peculiar special steel, the distinctive feature of which is its unusually low hysteresis loss. The plates are stamped out in the form of rings, and a series of long slots are punched near the edges. These rings are then clamped firmly to a central hub or spider by means of brass end plates. There are no bolts passing through the laminated core, and no iron comes in contact with these plates. As a consequence of this there is no leakage of magnetism and no development of potential in any part of the core to cause eddy currents and waste energy. The holes in the plates form "tunnels," in which the armature windings are placed. Fig. 8 gives a very good idea of the appearance of the finished armature core.

It will be noted that the slots or tunnels are of unusual depth for this style of armature, and, in the particular core illustrated, the depth of copper to be placed in each slot is at least three times as much as is used by most builders for an armature of similar size.

Another peculiarity of this machine is the large number of poles used. This feature, which in ordinary designs would be bad practice, is a valuable one of this peculiar style of design, enabling the builders to greatly shorten their armature conductors, and to use on all their armatures what may be described as the cylindro-hexagonal style of drum winding. In this winding all parts of every conductor of any particular layer on the armature lie in the same cylindrical surface, and the windings do not bend down over the end of the armature core at any point, and the conductors being placed through the core and below the surface, no binding wire is necessary.

The commutators of all of these machines are built of tempered copper with pure mica insulation throughout.

They are carefully and solidly built and, as a rule, are large in diameter and comparatively short in length. They are not mounted on the shaft, as is the usual practice, but are carried by a projecting ring of the spider. Fig. 9 is a view of the completed armature for a 20u-kilowatt direct-connected railway generator.

One of the most important and noticeable features of these armatures is the ventilation. The armature being large in diameter, the central opening is also large and extends entirely through the armature from end to end, thus affording large heat-radiating surface. The principal ventilation is effected by the winding itself. The conductors cross one another in such a way as to form a sort of open lattice work with innumerable radial openings, through which the air circulates in great quantities.

But little heat is developed in the core of the armatures, since the quantity of iron is comparatively small, and the magnetic density low, and the armature being short and the ends of the windings so thoroughly cooled, it will be readily seen that there is small danger of over-heating one of these armatures, even with excessive loads.

Fig. 10 is a view of complete brush-holder arrangement. The brush holders project outward, and leave the entire outer end of the commutator free and accessible.

The only leads employed on the whole machine are one from the negative brush-holder ring to the negative terminal, and another from the positive brush-holder ring to the inner end of the balancing coils.

The brush holders themselves are very simple, and hold the brushes in such a way that they require no adjustment, but have only to be slipped into the holder. Working with brush holders absolutely fixed, there is entire freedom from sparking under any and all conditions of load.

The whole brush-holder arrangement is adjustable around the commutator, and by loosening the clamp bolts the brushes may be shifted backward or forward. This is only done, however, for the purpose of adjusting the compounding of the machine. By shifting the brushes in this way the machines may be adjusted through a range of from 10 per cent drop at full load to 10 per cent rise, and this without any effect whatever on the commutator.

Fig. 11 shows a curve of commercial efficiency taken from actual tests of a Thompson-Ryan 200-kilowatt railway generator. The peculiar features of this curve are not so much the good efficiency under heavy load as the unusually high efficiency under light loads and the very great range of uniform efficiency. This is due to the unusually small fixed losses, the result of the very small field energy consumed and the light core losses.

Another important feature of this dynamo is the great ease with which two or more machines may be worked in parallel. The design of the machine peculiarly fits it for this sort of service. They may be thrown in parallel while differing widely in voltage produced, and each machine will take its due proportion of the load, notwithstanding the fact that they may be greatly over-compounded. Two or more of these machines will work perfectly in parallel, and divide the lightest load evenly or maintain perfect unison with the entire load thrown off.

The Thompson-Ryan dynamos are built in sizes from 12½ kilowatt to 1,500 kilowatt capacity, both belted and direct connected. Fig. 1 shows the belted dynamo as well as the dynamo direct connected to the different types of the McEwen engines.

The manufacturers state they will be pleased to furnish handsomely illustrated catalogues of either their engine or dynamo to those who request them.

General Business.

[*From the Wall Street Journal.*]

Confidence in the situation has increased in various banking circles in the last few days by reason of special inquiries made by the head of one of the largest banking institutions in the street, the result of which he has communicated to a few friends. The purport of his statement is that in every trade, with remarkably few exceptions, the condition is better than it was last year, and satisfactory profits as a rule have been made. There is also a hopeful feeling in regard to the new year. He expresses the belief that if Congress act wisely in dealing with the financial question, there will be important advances in all lines of business next year.

Underwriters' National Electric Association.

In the issue of the ELECTRICAL REVIEW of October 23 notice was given of the meeting of this association to be held in New York city on December 10, and of the opportunity afforded electrical men generally, and particularly those coming into direct contact with the underwriters, to give their views respecting the rules now in force and any suggestions as to changes which in their opinion would be advantageous. Printed blanks were furnished and distributed for this purpose, and a large number of suggestions were received.

Discussion and voting on the questions at issue were not confined to the members of the Electrical Committee, but the full privileges of both were extended to all present.

While the changes made in the rules as a result of the suggestions submitted were considerable in number, very few of them were radical, and the general class of work which now receives the approval of the underwriters will not be greatly affected. It seemed to be the general opinion of those present that the rules were working satisfactorily both to the insurance and electrical interests, and that only such changes should be made as were necessary on account of the progress of the electrical industry itself, or where experience had shown that additions to the present rules were desired.

Among the more important changes made were the following, which were given in the order of the sections amended in the present rules:

The grounding of the frames of generators may be allowed when necessary, by written permission; this change being made on account of the introduction of direct-connected and extremely large and heavy machines.

Switches for motors must hereafter plainly indicate whether the current is on or off.

Rules were adopted requiring wires to be protected from mechanical injury in buildings, high potential wires by substantial boxing, giving a reasonable air space, and low tension wires either by boxing or by an approved iron-armored conduit tubing.

It was ruled that the mesh of wire netting for arc light globes should not exceed one and one-quarter inch.

Switches on hanger-boards must cut out both poles of the lamp.

The use of wire smaller than No. 14 B. & S. will not hereafter be allowed except for pendant and fixture work.

The rules as to the construction and painting or filling moulding were made more explicit.

The rules for special wiring in breweries, etc., will require that joints and splices be avoided as far as possible, and that switches in damp places be mounted on porcelain knobs so as to give an air space behind them.

It will hereafter be allowable to draw in strings into conduits for the purpose of pulling in the conductors, which should not be placed in the conduit until the mechanical work on the building has been completed as far as possible.

Hereafter cut-outs will not be allowed in the canopies or shells of fixtures. Hereafter circuits must be arranged so that no group of lamps (whether on the same fixture or not) requiring a current of more than six amperes will be allowed to be ultimately dependent upon one cut-out, except that special permission may be given in writing for departure from this rule in case of large chandeliers.

Steps were taken which will tend to improve the character of double conductors, and hereafter, except for pendants and fixture work, a solid rubber insulation protected by durable braid will be required for flexible conductors.

Supports for motor ceiling fans must have an insulator interposed between them and the motor.

The electrical requirements of the standard for car barns and repair shops as contained in the schedule now used by a number of rating organizations are now to be incorporated in the rules.

Service switches must disconnect all of the wires entering the building—that is, on the three-wire system. All three wires must be opened by operating the switch.

The use of brass-sheathed interior conduit and vulca tubing will not hereafter be approved for bushings.

The use of incandescent lamps in series circuits for decorative purposes will be allowed by special written permission when installed in a proper manner.

Rules for electric heating apparatus were adopted, which will require, in addition to the general wiring being done in accordance with rules, that the switches shall plainly indicate whether the current is on or off; that the attachment of the feed wires be in plain sight; that stationary heaters be treated as stoves, and that the flexible conductor necessary for use with electric irons and other devices of a similar nature, shall have an insulation that will not be injured by heat, such as asbestos, which insulation must be protected from mechanical injury by a substantial outer braiding.

In addition to the above, which constitute the principal changes in the rules, it was suggested that the table of safe-carrying capacity for wires was too near the actual limit of safety, and the matter was referred to the chairman of the committee for tests, investigation and reports.

The matter of obtaining more effective and more efficiently constructed devices for automatic safety cut-outs was referred to the Committee on Tests, with request that they obtain all the information possible in relation to the proper construction of fuse blocks, length of fuses and efficiency of fuse metal.

The Committee on Tests was also requested to report a standard for iron or steel armored conduit which should meet the approval of the committee.

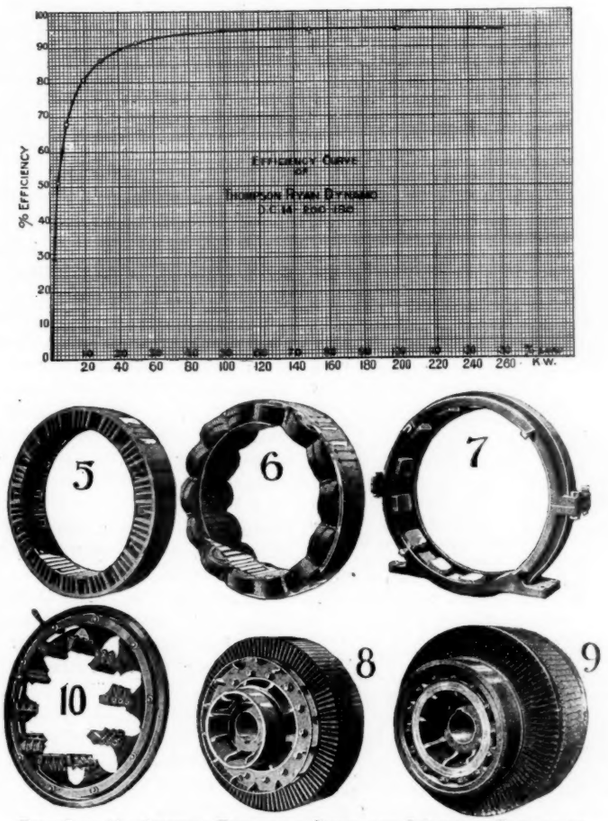
A number of resolutions were adopted pledging the members of the committee and others present to exert their influence in enforcing the rules and requirements of the National Board, and to co-operate with the Electrical Bureau in furnishing facts regarding devices and materials which may not be constructed in accordance therewith.

The attendance was large and of a representative character, the Electrical Committee being represented by F. E. Cabot, superintendent of the inspection and electrical department of the Boston Board of Fire Underwriters; C. M. Goddard, secretary of the New England Insurance Exchange; William McDevitt, inspector Philadelphia Fire Underwriters' Association; E. A. Fitzgerald, inspector Underwriters' Association of New York State; W. H. Merrill, Jr., electrician Chicago Fire Underwriters' Association; A. E. Braddell, inspector Underwriters' Association of the Middle Department; A. M. Schoen, electrician Southeastern Tariff Association, and W. A. Anderson, superintendent survey department New York Board of Fire Underwriters.

Among the others present at the meeting were President Nichols, of the National, of Hartford; Vice-President Washburn, of the Home, of New York; Assistant Secretary Lowe, of the L. & L. & G., of Atlanta; G. B. Lauder, inspector New Hampshire Board of Underwriters; J. E. Cole, inspector Boston Wire Department; S. W. Wilson, inspector Boston Fire Underwriters' Union; E. V. French, inspector Factory Mutual Fire Insurance Companies; Ralph Sweetland and J. Couilliard, inspectors New England Insurance Exchange; J. C. Forsyth, inspector New York Board of Fire Underwriters; Frank Kitton, inspector Buffalo Association of Fire Underwriters; H. H. Hornsby, chief inspector city of Chicago; S. F. Bottom, inspector Kansas City Fire Underwriters' Association, and M. L. Stern, city electrician, Denver, Colo.

The work of the Electrical Committee of this association has now become generally recognized throughout the United States by the various boards of fire underwriters, which have adopted the rules as recommended by the committee, and quite a number of cities have also incorporated these rules in their city ordinances regulating the introduction and maintenance of electric light and power wiring.

There can be no question but that the Electrical Committee has earnestly endeavored to bring electrical installations to a higher level of perfection, and on the whole, their work has been attended with beneficial results, valuable to the manufacturer, the consumer and the association they represent.



FIGS. 5 TO 11.—SHOWING EFFICIENCY CURVE AND IMPORTANT DETAILS OF THOMPSON-RYAN DYNAMO. (See preceding page.)

OBITUARY.

George B. Whitney, electrician of the Lowell, Mass., fire department, died recently at his home in Lowell. He was 51 years old and had a good war record.

Levi Perkins, 64 years of age, president of the Holyoke, Mass., Street Railway Company, died on December 15. He was born in Holyoke and lived there all his life. He was a representative in the legislature in 1886 and a State senator in 1888 and 1889.

STORAGE BATTERY APPLICATIONS.

A Topical Discussion before the American Institute of Electrical Engineers, New York and Chicago, November 20, 1895.

COMMUNICATION BY CARL HERING ON "PAST AND PRESENT OBSTACLES IN THE STORAGE BATTERY DEVELOPMENT."

(Concluded from page 353.)

But there is another way of meeting those unavoidable effects of use, which has recently been applied, and which seems to be a much more rational and effective solution of this vexed problem, at least when lightness and smaller first cost are desired. Instead of making the positive plates heavy and expensive, they may be made very light, cheap and easily replaceable; their life may then be shorter, but the battery will be as good as new whenever these perishable parts have been renewed; their life is soon known to the user and he can then readily determine for himself how much he must allow for amortization. Any one who has urged the use of accumulators will appreciate the great value of being able to satisfy the user as to the amortization factor. A purchaser will believe you if you admit that the life of the perishable parts will be comparatively short, but he will not believe you if you say it will be long, even if you are telling the truth. But such a method, to be successful, requires that the old plates and sludge can be converted at a small cost into new plates; this it seems can now be done and the writer believes that this alone will have a very important bearing on the outlook of the storage battery, at least for portable cells as are required for traction and many other purposes, or for both portable and stationary plants if the first cost is an important factor. Such a method becomes practicable only when the chief factor in the cost of the plate is the material, the cost of labor and forming being small.

For stationary purposes, in which the only objection to the weight is the first cost of the lead, good storage batteries have been used abroad with success for some time, provided the rates of charge and discharge are kept low. Assuming that the same storage batteries may be made in this country as well, the question which affects the outlook here is then only one of the cost. But neither abroad nor here does there seem to be a battery in the market in which the weight has been sufficiently reduced and the rate sufficiently increased for a really successful traction battery, the success of which has been demonstrated beyond dispute. It is here assumed that to the public and to railway companies traction batteries are not a demonstrated success until a traction company which has no affiliation with the accumulator makers finds it to its own advantage to use them in preference to other systems. That accumulator traction is the ideal system has been repeatedly acknowledged by good authorities, and that this field for batteries is very large, and perhaps larger than that for stationary work, is likely. The large first cost and cost of maintenance of the overhead construction for trolley roads, the large power station required and the threatened damages done by electrolysis, would doubtless turn the tables in favor of the storage battery for many long roads on which traffic is not too dense, and possibly also for many suburban steam roads.

It seems to the writer that the only batteries which have a promising outlook for this very trying work are those which have a very large surface, very small depth of active material formed electrolytically, and a very free circulation of the acid. The lead frames should be made only thick enough for proper conduction, the batteries must be cheap in first cost, and the positive plates should be capable of being replaced comparatively frequently at small cost. They should be proportioned so that a discharge corresponds to one trip of the car—and only one. To claim as an advantage that a battery can run a car, say, four trips, is mere deception, and to the intelligent engineer it is simply an admission that it can do no better. No one would think of carrying four relays of horses on a trailer of a horse car, and why should the equivalent be done with the storage battery, unless it be that the battery can do no better, and that it can not be discharged rapidly enough so that the capacity and weight may be reduced to that required to run only one trip? The ideal is certainly a single-trip discharge. If the rate for a four-trip battery could be increased four times without materially affecting the capacity, its weight and capacity for a single-trip discharge would evidently need be only one-fourth as great. The charging rate should also be equal in hours to the discharge rate, or else it will take a plant of more than two sets of batteries to a car.

These various ideals mentioned above would have only a theoretical and not a practical interest, were it not for the fact that recent tests have shown that a near approach to them has apparently been reached; it is somewhat premature at present to say more until the results of the tests have been confirmed by practice.

The above discussion may be briefly summarized as follows: Cessation of litigation and the development of the Planté type of cells make the storage battery outlook in this country much brighter; the cost of a guaranteed storage battery seems in many cases to be too nearly equal to that of the direct generators to encourage their general adoption. A reduction in the cost would therefore open a large field, much larger than in proportion to the reduction; the renting of accumulators seems a commendable method for introducing them. Most of the diseases which storage batteries are subject to could be avoided or made much less disastrous by having large surfaces, small depths of active material and free circulation. The first cost would be reduced and the vexing question of the uncertain amortization settled by a light, short-lived, cheap positive plate and a cheap process of reconverting old into new positive plates. Storage batteries for slow discharges have been a success abroad; a very large additional field would be opened by a light, cheap, rapid-rate cell.

The objection to a plate with a thin layer of active material is, that it may not retain its charge as well as one with a thick layer of pellets, but in most cases in which rapid rates are desired or cannot be avoided the small loss in standing is probably more than balanced by the fact that the plates are not injured by rapid rates. As a rule, long periods between charges go hand in hand with slow discharges and less objection to great weight, while short periods between charges, high rates of discharges and lightness usually go together.

In conclusion, the writer desires to take this opportunity to make the following recommendations in the interests of engineers who may have to calculate accumulator plants:

That rates of charge and discharge be designated in hours and fractions, the current (or for power purposes, the watts) during that time being considered to be kept constant. There can then be no mistake as to what is meant, as this represents the time in hours during which a cell will continue to give a practically constant current before the voltage falls below its limit.

That efficiencies and capacities be always accompanied by the corresponding rate in hours.

That in giving an efficiency it should always be stated whether it is for ampere hours or for watt hours.

That for portable batteries intended for power purposes the capacity be given in watt hours instead of ampere hours, and that the weight given be that of the complete cell ready for use, as distinguished from the weight of the plates alone.

OUR CANADIAN LETTER.

LONDON, ONT. — The London Street Railway Company will remodel their car sheds in the Spring.

SCHOMBERG, ONT.—A number of capitalists propose to build an electric road from Schomberg, Ont., to Newmarket.

CHATHAM, ONT.—Delegates in connection with the proposed electric railway are expected to visit the city at an early date.

QUEBEC, QUE.—The act incorporating the Sherbrooke Street Railway Company has been passed by the Quebec Legislature.

WATERLOO, ONT.—The Board of Trade of Waterloo, Ont., has recommended a bonus of $30,000 to the International Radical Railway.

GUELPH, ONT.—The Hamilton Radical Company now gives notice that it will apply to Parliament for power to extend the Guelph branch to Lake Huron.

BROCKVILLE, ONT. — Brockville Electric Street Railway Company, incorporated; capital, $200,000. Promoters: W. H. Comstock, W. A. Gilmour, S. Cossitt and others.

DIGBY, N. S.—A scheme is under consideration with the purpose of extending the Bear River electric light to Digby, N. S. The power would be generated by the Bear River waterfalls, and would be sent over 10 miles of wire.

FLAMBORA, ONT.—The township of East Flamboro has offered to submit a bonus by-law for $30,000 and the village of Watertown one for $6,000 in favor of the proposed International Radical Electric Railway Company.

HAMPTON, N. B.—Hampton will in all probability soon have the electric light. Cecil March has already secured a large number of signatures to contracts for the use of the future illuminant. Electric cars are talked of, too, between Hampton and St. John, N. B.

TORONTO, ONT.—The Toronto, Hamilton & Niagara Falls electric railway is a new enterprise which is seeking incorporation. It proposes to connect by means of electricity the points named. Clark, Bowes, Hilton & Swabey, Toronto, are solicitors for the applicants.

ST. CATHARINE'S, ONT.—Lincoln Street Railway, Traction and Light Company, incorporated; capital, $90,000. Objects: To build an electric railway and to distribute electricity for light, heat and power. Incorporators: E. H. Hill, H. A. Kings, J. S. Campbell and others.

KINGSTON, ONT.—The Street Railway Company, of Kingston, Ont., will extend its track into the eastern end of the city and run cars to the lower depot, provided the corporation will make the streets on which the rails are to be laid. It is likely the corporation will accede to the company's terms.

OTTAWA, ONT.—The Ottawa Street Railway Company has purchased 24 acres of land opposite the Experimental Farm, and will make an excursion park of it next Summer. The company expect that their new park will not take any of the patronage away from the Rockliffe Park, their line to which has proved so profitable.

RICHMOND HILL, ONT.—The Metropolitan Electric Railway Company has been given a year's extension of the time in which the road is to be completed to Richmond Hill.

At Osgoode Hall, the other day, an order was made declaring the Brantford Electric and Power Company insolvent and appointing Robert Henry provisional liquidator.

PORT PERRY, ONT.—Among the announcements of applications for railway legislation is one to incorporate the Huron & Ontario Railway Company, to build an electric railway from Port Perry to Kincardine, passing through the counties of York, Simcoe, Cardwell, Grey and Bruce.

The promoters of the Barrie & Allandale electric railway have almost completed arrangements with the Grand Trunk railway by which they will get the land just west of Minett's Point property, which is suitably wooded and better adapted for park purposes than Minett Point.

NAPIERVILLE, QUE.—The Napierville Junction railway, a new line between St. Remi and Stottsville, Que., is preparing for active work. The whole distance is about 22 miles, running through the parishes of St. Michel, St. Edward, Douglassburg and St. Phillippe, a district now without railway service. The Dominion Government has subsidized the road with $3,500 per mile, and the towns of Napierville and St. Edward have given bonuses of $10,000 and $2,500, respectively. The town council of St. Remi will grant a subsidy of $3,000. The whole work is to be completed by July 5 next, or the subsidy is lost. Hon. Mr. Laviolette is president of the road and Mr. Lafontaine, secretary. This will be the first electric road in the province outside of Montreal and vicinity. It will connect with the Grand Trunk at Stottsville.

J. A. C.

Montreal, December 13.

PERSONAL.

Mr. Thos. J. Hayward, of Bartlett, Hayward & Company, of Baltimore, spent several days last week with New York friends.

Mr. G. H. Walbridge, secretary of the White-Crosby company, of Baltimore, Md., was among the visitors to New York city last week.

Mr. Nicholas S. Hill, Jr., the electrical engineer of the Electrical Subway Commission of Baltimore, was a visitor in New York last week.

Mr. Charles M. Sprague, assistant treasurer of the Windsor Print Works, North Adams, Mass., has resigned that position to accept the treasurership of the Sprague Electric Elevator Company, of New York city, of which his brother, Lieut. Frank J. Sprague, is president.

President Charles P. Clarke, of the New York, New Haven & Hartford Railroad, accompanied by a number of stockholders and directors, visited the East Pittsburgh plant of the Westinghouse Electric and Manufacturing Company last week. It is rumored that the railroad company contemplates the further adoption of electric power on its lines.

Mr. J. E. Keelyn, president of the Western Telephone Construction Company, of Chicago, takes quite an interest in the suggestion of using the telephone systems of the country as an adjunct to the United States postal service. Under date of December 17 he writes to the ELECTRICAL REVIEW that he had brought the consideration of postal telephone matters to the attention of the Postmaster-General.

Mr. J. H. Rhotehamel, president of the Columbia Lamp Company, of St. Louis, has returned home after a sojourn of several days in the East, looking after the interests of his branch office in New York. The gratifying results of the establishment of an Eastern office for the Columbia lamp caused Mr. Rhotehamel to return in a proper humor for Christmas festivities.

A number of telegraph men and their friends were recently entertained at a "quick lunch" (lasting from 1 to 5.30 P. M.) by Captain F. C. Mason, superintendent of the Telegraph Bureau of Brooklyn. The repast was served in the new Crescent Club, of Brooklyn, and enjoyed with genuine fervor by the following-named gentlemen: John Emerick, general superintendent Postal Telegraph Company; J. H. Pettingill, superintendent Postal Telegraph, Boston; W. L. Candee and George T. Manson, Okonite Company, New York; Morris Mead, city electrician, Pittsburgh; Frederick Pearce, New York; Samuel Duncan, ex-president National Electric Light Association, Pittsburgh; Stephen A. Austin, superintendent French Cable Company, New York; M. W. Raynes, chief delivery department, Western Union Telegraph Company; H. B. Reynolds, superintendent Postal Telegraph Company, Buffalo, N. Y., and C. O. Baker, Jr., New York.

LITERARY.

Two fresh and charming Christmas stories, "The White Ladye," by Clinton Scollard, and a carol by Rev. Archer Gurney—both the latter in verse—are the principal holiday features of the issue of December 19 of *Collier's Weekly*,

The *Photographic Times* (60–62 East Eleventh street, New York) for January contains, besides a host of attractions, literary and pictorial, the commencement of an Encyclopædia of Photography by the editor, Mr. Walter E. Woodbury. It promises to be the most extensive work upon the art and science of photography ever attempted. When completed it will contain over 2,000 references and more than 500 diagrams, woodcuts and half-tone illustrations. Definitions are given of every word employed; all the various processes are described, together with reliable and useful formulæ.

Pacific Cable Company.

The incorporators of the Pacific Cable Company, recently organized under the laws of the State of New York, held a meeting on December 19 at the office of the Central and South American Telegraph Company. The following board of directors was elected: J. Pierpont Morgan, George S. Bowdin, Edmund L. Baylies, J. Kennedy Tod, James A. Scrymser. Mr. James A. Scrymser was elected president and Edmund L. Baylies vice-president and acting treasurer. An executive committee was appointed and authorized to arrange to increase the capital of the company to $10,000,000. It is estimated that the company will require 7,249 miles of cable to connect Japan with the United States.

Telephones for East Providence, R. I.

The East Providence, R. I., Town Council has granted a franchise to the Nixon Telephone and Electrical Supply Company. The petition had been pending before the board since August and there had been several hearings. The Providence Telephone Company persistently opposed the granting of the franchise. The Nixon company, it is said, will have a central office in the town, and will charge from $25 to $40 for the use of its telephones. It claims to have 103 subscribers; to have two wires in operation from Providence to Boston; agrees to give subscribers connection with Boston without extra charge.

Brooklyn Electrical Society.

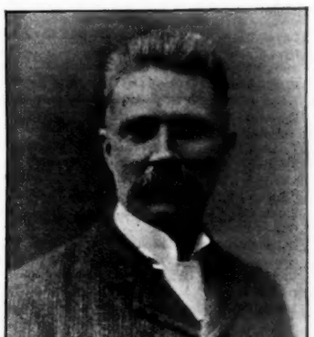
The lecture by Mr. Harry E. Dey on "Hydraulic Gearing Applied to Electric Motors," which was to have been delivered before the Brooklyn, N. Y., Electrical Society on the evening of December 17, has been postponed to January 7.

Mr. A. C. White, general superintendent of the Providence Telephone Company, was a New York visitor last week.

Henry D. Stanley.

The countenance presented in the accompanying illustration is a familiar one to many readers of the ELECTRICAL REVIEW. Mr. Henry D. Stanley is a genuine "old timer" in the electrical business and is widely known among people in the electric light, railway, telephone and telegraph branches of the industry. He has been engaged in the manufacturing business since 1867, and spent, all told, 18 years of his business career with the Bridgeport Brass Company, of Bridgeport, Conn.

Mr. Stanley was secretary of the Bridgeport Electric Manufacturing Company, which had charge of the Bridgeport Brass Company's electrical business. In 1892 he resigned this position and became factory superintendent of the Okonite Company's plant at Passaic, N. J. On July 1, 1895, he severed his connection with the Okonite Company and



HENRY D. STANLEY.

went with the National India Rubber Company, of Bristol, R. I.

The National company are among the largest manufacturers of rubber goods in this country and their insulated wire department is already well known in the trade owing to the favorable impression the "N. I. R." wires have made. The company employs 1,600 hands and its plant covers 18 acres of ground. The company has recently been engaged in rearranging its insulated wire factory and adding new machinery to it. All this work has been done under Mr. Stanley's supervision. When its new plant is completed the company will be better prepared than ever to handle orders for the "N. I. R." brands of wire and will also manufacture aerial, submarine and underground cables.

When these changes in its plant have been completed the National India Rubber Company will open an office in New York city, of which Mr. Stanley will be the manager.

ELECTRIC RAILWAY NOTES.

The Newton, Mass., Street Railway Company directors have declared a regular quarterly dividend of two per cent, payable January 1.

The Meriden, Conn., Street Railway Company has been sold to the New York, New Haven & Hartford Railroad Company for $750,000.

It is rumored that the Union Cable Company's road in Kansas City, Mo., may be equipped with electricity. The road is now in a receiver's hands, and never was operated.

At a recent auction in Chillicothe, Mo., horses were sold at $3 apiece. It is among the possibilities that the department stores in the large cities may soon offer bargain-counter horses at $2.99 and $1.78.

Judge Jenkins on December 17 appointed John Larkin, of New York, special master for the purpose of taking proof as to the allegations of the complaints in the bill on which the Milwaukee, Wis., Street Railway Company went into receivership.

The Detroit, Mich., Railway Company's new power station is completed. It is equipped with four of the Walker Manufacturing Company's direct-connected generators—two of 800-kilowatt and two of 400-kilowatt capacity. The Walker company has just received an order for two more 800-kilowatt machines for the same plant.

"Here, don't drop your money into that thing," was the inhibition savagely poured into the ear of a Conshohocken man on a Norristown trolley car on West Main street. "Ain't that where passengers put their fare?" asked the terrified Conshohocken man, who had let go of three nickels in payment of fare for himself and two ladies. "Naw," was the reply, as the conductor gathered up the coins that had gone through the sand hopper.—*Norristown, Pa., Times.*

An ordinance passed by the Chicago authorities in 1881 requires every person, firm or corporation engaged in the operation and running of street cars for the conveyance of passengers to obtain a license therefor, for which such person shall pay the sum of $50 for each year operated and run, or proposed to be operated and run, during the year. Any person failing or refusing to take out a license shall be subject to a fine of not less than $50 and not more than $200 for each day.

ELECTRIC LIGHT FLASHES.

The Bar Harbor, Me., Electric Light Company are making extensive improvements to their plant. New apparatus is being installed.

It is reported that electric lights are to be installed in the Sivan Hindoo Temple at Kochieadde, on the main road to Mutwal in Ceylon, and it is likely that other wealthy temples will follow this example.

The security holders of the Edison Electric Light Company of Philadelphia will be called upon to vote on the proposition to lease the company to the Pennsylvania Heat, Light and Power Company at a meeting to be held December 31.

The Waltham, Mass., aldermanic committee on municipal lighting have made a report recommending the purchase by the city of the local gas and electric light plant, valued at $253,000. The incoming board of aldermen will, it is expected, take similar action early in the year and the question will reach the people within a short time thereafter.

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SPECIAL NOTICE TO ADVERTISERS.

CHANGES for advertisements must be in this office by Friday noon for the following week's issue. NEW ADVERTISEMENTS should be in the office not later than Saturday noon to insure publication the following week.

NEW YORK, DEC. 25, 1895.

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This issue of the ELECTRICAL REVIEW, which marks the close of the twenty-seventh volume of the oldest electrical weekly in the United States, will reach many of our subscribers on Christmas Day. We wish every one of our readers and patrons a very Merry Christmas, and venture to express the hope that the cordial and friendly relations which have been mutual for so many years will continue for many years to come.

We expect that New York city may be visited with a few unusually severe snow and sleet storms during this Winter, and that the Lenox Avenue Underground Trolley Railway will be put to a severe test. A very large amount of money will be spent in constructing other roads of this type if the Lenox avenue line prove successful. We have great hopes of its being able to operate under any condition of weather usual in this climate.

Comptroller Ashbel P. Fitch, of New York city, deserves the thanks of every citizen for the efforts he is making to have the city electric lighting extended to all parts of the great East Side. It has become a trite saying that, as a preventive of crime, one arc light is better than a policeman, and in the densely populated district referred to, this, as well as the many other advantages of well-lighted streets, will be of great benefit to the people. If Mr. Fitch's ideas are carried out, the city lighting of New York will be double what it is now. We wish him success in his efforts.

ACETYLENE GAS vs. ELECTRIC LIGHT.

Although the owners of the acetylene gas patents do not make the claim, there are many people in Boston who, having studied the subject, emphatically declare that acetylene gas will supersede all forms of electric lighting and all use of present gas; just as water gas superseded coal gas, and coal gas superseded other forms of lighting.

This appeared in the Boston *News Bureau* for December 16. The paper was distributed in State street and vicinity at 3:16:57 P. M., and we now have an explanation of the queer sounds we heard at that exact moment. The gentle, rippling murmur was the smile which illumined the countenance of Mr. C. L. Edgar, of the Edison Electric Illuminating Company of Boston. The hearty, rumbling roar which was wafted along the shores of Long Island Sound and down Park Row to number 13 was Mr. Fred Gilbert, of the Boston Electric Light Company, reciting poetry, inspired by the reading of the paragraph quoted. It rang in our ears like the grand blank verse of Longfellow's "Hiawatha," but all that reached us whole was some reference to Laughing Water, which sounded very like "Ha! Ha!"

WALL STREET AND THE ELECTRICAL STOCK MARKET.

A panic developed in financial circles on Friday, the direct result of President Cleveland's special message to Congress on the Venezuelan matter. The first effect was a general unloading of American securities held in London. It was accompanied by disquieting rumors regarding the disposition of foreigners to call back their balances and actual demand for important amounts. New York bankers became frightened and on Friday very generally called loans. Money went up to 80 per cent on the New York Stock Exchange. The inability to secure funds with which to carry stocks caused a general unloading. Holders of securities on two continents fairly scrambled for a market, taking whatever price they could secure. The result was declines ranging from 4 to 15 per cent, and only partial recoveries. Five New York Stock Exchange houses went down in the crash, two in Boston and one in Philadelphia. The exports of gold during the week were $3,400,000. This movement did not represent the demand for the reason that would-be shippers, owing to the press of bank business, found it impossible to give checks for greenbacks with which to secure gold. It was calculated that the President's message sent to Congress last night would have a reassuring effect. There is no doubt that if his recommendation should be carried out, it would go a great way towards repairing the damage already done. However, there appears to be little probability of such action on the part of Congress, and this construction prevented the message from restoring confidence to the degree expected. Conservative houses who have been through a number of panics say that the end is not in sight. Even if the worst were already known, foreign capital has had a shock from which it will not recover for a long time. Add to this the liquidation sure to follow a sharp drop, and the outlook does not appear to be hopeful. On the other hand, if the country approaches open hostilities with its currency in the present condition, it would be forced to take back everything in the way of a security owned abroad.

As might have been expected, there was no security on the list which did not suffer heavily. Electrical stocks shared the fate of the others. General Electric touched 31⅛ on Tuesday and declined to 20 on Friday, closing to-day at 23¼. The decline in Western Union was from 89¾ to 82½. To this latter figure 1¼ per cent should be added for purposes

of comparison. The stock of the Edison Electric Illuminating Company of New York sold at 94 and American Telegraph and Cable at 92, the lowest prices recorded in months.

On the Boston Exchange, Westinghouse common was offered to-day at 30. American Bell Telephone was offered at 192 which is a decline of 11 points from the high of the week. Erie Telephone, which was 63 on Tuesday, closed at 58. New England Telephone went as high as 89 and declined to 85 asked. On the Philadelphia Exchange, Electric Storage Battery common and preferred collapsed on Friday, prices being 23 and 25½ respectively as against 38½ and 40 earlier in the week.

A number of electrical dividends were declared this week, as follows: American District Telegraph, 1 per cent, payable December 31, to stock of record December 25. Central and South American Telegraph, 1¾, payable January 6, to stock of record December 29. International Bell Telephone, limited, 6 per cent, payable January 3, to stock of record December 25. Mexican Telegraph, 2½, payable January 13, to stock of record January 5. Westinghouse preferred, 1¾, payable January 2, to stock of record December 24. BAIN.

New York, December 21, 1895.

General Electric Company vs. Magowan.

Further documentary evidence in the case of the General Electric Company *vs.* Frank A. Magowan was submitted before Vice-Chancellor Bird, at Trenton, N. J., on December 18. The suit was brought by the General Electric Company to recover from Mr. Magowan $75,000 of the stock of the Trenton Light and Power Company. It is alleged that Mr. Magowan agreed with Franck Z. Maguire, agent of the General Electric Company, to give him (Maguire) one-half of the profits to be made out of the organization in 1892 of the Edison Electric Light and Power Company of Trenton, which profits to Mr. McGowan were $150,000 of the stock of the Trenton Light and Power Company upon its absorption of the local Edison company and the old People's Electric Company, of Trenton. The claim of the General Electric Company is that, as Maguire was acting as their agent, he could not make a profit to himself out of the transaction, but that anything that accrued to his benefit above his regular and stated compensation would, in law, belong to them, his employers.

The New Mobile Exchange.

Mr. Paul Minnis, general manager of the Home Telephone Company, of Mobile, Ala., was in New York last week. The new exchange of his company is now supplying service to 500 subscribers daily, and an increase to 800 is assured as soon as the exchange extension will permit. The Southern Bell company's exchange has 200 subscribers at present.

An English Electric Pumping Plant.

An interesting example of the facility with which electricity lends itself to the transmission of power will shortly be seen on the premises of Smith's Dock Company, South Shields, says London *Engineering*. There is at present there a floating dock, upon which are erected engines and pumps for the purpose of pumping out the water when it is desired to float a vessel. The boilers which supply the steam are, however, on the shore, the connection being made by flexible steam pipes in a somewhat cumbrous and unsatisfactory manner. A new dock of the same type will be shortly installed, but in this case the power is to be transmitted from the shore by electric conductors. On the dock there will be erected eight 18-inch centrifugal pumps, each driven by an independent motor of 60 brake horse-power. The fan of the pump and the armature of the corresponding electric motor will be on the same vertical shaft, extending from the deck to the bottom of the floating structure, the weight being carried on ball bearings. The speed of rotation will be 385 revolutions per minute, and it is expected the plant will raise 16,000 tons of water per hour against a mean head of 18 feet. If this be realized, it will be possible to raise the dock with a ship of the largest tonnage in about half an hour. The generating plant will be fixed on shore at a distance of about 200 yards from the dock, and will comprise two sets of direct-coupled engines and dynamos capable of supplying 850 amperes at 500 volts. This current will be transmitted through Fowler-Waring armored cables to a cabin on the deck, from whence a single attendant will be able, by means of switches and regulating resistances, to control all the motors.

To Oust the Central Union Telephone Company.

Last Saturday the Central Union Telephone Company received a severe blow in Dayton, Ohio. The circuit court decided that it had no right in the streets or alleys with its poles and wires, and issued an order of ouster. The company had a franchise for 10 years, and neglected to have the franchise renewed. For two years it had no franchise, but no one molested or disputed its right to the streets until a rival company came in and applied for a franchise.

George D. Burton Insolvent.

George D. Burton, inventor of a process of electric welding bearing his name, is a petitioner in insolvency in the Suffolk county, Mass., court. His liabilities are placed at $117,000.

Mr. A. P. Trotter, B.A., M.I.E.E., of London, formerly editor of the *Electrician*, will leave for the Cape of Good Hope early in the new year to accept the position of government electrician and inspector, to which he was recently appointed.

The Philadelphia Strike.

The strike of 4,500 employés of the Union Traction Company, of Philadelphia, which began early last week, practically paralyzed the street car service of the city. A few cars were run during the week on long headway and guarded by police. A number of violent demonstrations were made by the mob, which, in several instances the police had difficulty in dispersing. But no such serious breaches of the peace as occurred during the Brooklyn strike have been reported.

Last Saturday it was thought that the strike had been settled. President Welsh, of the Union Traction Company, issued terms on which the strikers could return to work. They included the engagement of 3,500 of the 4,500 old men, the remainder to be given first chance at vacancies. Contracts with the new men from outside of the city were to be canceled. He agreed to meet a committee of the old employés, something he is said to have been willing to do all along, but he would not recognize the association.

Sunday was the first really quiet day of the strike. The Union Traction Company decided to make no attempt to run cars. The strikers held a long and secret meeting in the afternoon, and in the evening a committee representing the strikers and officials of the traction company held a conference that lasted until after midnight. Propositions looking to a settlement of the strike are said to have been made by both sides.

President Welsh, of the Union Traction Company, issued a statement on Sunday night in which he gave his version of the trouble. Mr. Welsh practically declares that he will never recognize the Amalgamated Association of Street Railway Employés, and says that there was no dissatisfaction among his men until labor agitators stirred them up to strike.

The tying up of the street cars has had a very disastrous effect on the holiday trade and general business in Philadelphia. The opinion has been expressed that the strike will not be finally settled without a bloody riot.

The Standard Has "Perfected Its System."

[*From the Philadelphia Public Ledger, December 18, 1895.*]

Gen. J. S. Clarkson, General McNaught and a number of electricians, representing the Philadelphia Standard Telephone Company, appeared yesterday before a subcommittee of Councils' Electrical Committee, which was appointed to inquire into the Standard Telephone Company. General Clarkson stated that they had perfected their system and were now in a position to give an excellent service at low rates. They came to Philadelphia in good faith, he said, and were ready to do what was right toward the city and the public.

The Oldest Electrical Weekly in the United States.

TO THE EDITOR OF ELECTRICAL REVIEW:

The writer has had several occasions of late to take up the position that the ELECTRICAL REVIEW is the oldest electrical weekly published in the United States. If you can give us any statements as to the facts of the case, we would like to hear from you.

Yours truly,

New York, December 18, 1895.

The best answer to make to this inquiry is to quote in full an editorial on the subject which appeared in the ELECTRICAL REVIEW for January 23, 1895, as follows:

Our esteemed contemporary, the *Western Electrician*, in its issue of January 15, 1895, said:

The *Electrical World* is not the "pioneer in its line," as it claims. The ELECTRICAL REVIEW was the first general weekly electrical paper published in the United States, and is entitled to whatever distinction there is arising from that fact. The *Electrical World* is an offshoot of the old *Operator*, an obscure telegraphic publication, with which the present proprietor of the *World*, an ex-telegraph operator—not an electrical engineer or a journalist—became connected while yet employed by the Western Union company.

We are glad to confirm the statement of our contemporary. Here are the facts: The last number of the *Operator and Electrical World* appeared on April 21, 1883. A week later, that is, on April 28, 1883, the first number of *The Electrical World* appeared as a weekly. From this time until its final demise *The Operator* appeared as a separate sheet.

The first number of the ELECTRICAL REVIEW (which had been previously published for over a year as THE REVIEW OF THE TELEPHONE AND TELEGRAPH), a weekly journal devoted to all electrical interests, appeared on March 22, 1883, thus antedating *The Electrical World* by over five weeks.

This is a small margin, but sufficient to establish the facts, which are all matters of record and can be verified.

Therefore, remember that, in spite of tons of chromatic circulars from W. J. Johnston's office, the first general electrical weekly published in the United States and in existence to-day is the ELECTRICAL REVIEW.

Philadelphia Electric Storage Battery Renting Company.

The Philadelphia Electric Storage Battery Renting Company has been incorporated with a liberal charter, under the New Jersey laws, for the purpose of renting and selling the batteries manufactured by the Electric Storage Battery Company, of Philadelphia, manufacturers of the chloride accumulator, and for the operating of various other kindred and allied devices and inventions. The capital stock of the company is $300,000, divided into 30,000 non-assessable, full-paid shares of $10 each.

A Westinghouse Dividend.

The Westinghouse Electric and Manufacturing Company, on December 19, declared the regular quarterly dividend of one and three-quarters per cent on the preferred stock, payable January 2. Transfer books closed December 23 and reopen January 3.

WATER POWER—ITS GENERATION AND TRANSMISSION.

READ BEFORE THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS, NEW YORK, DECEMBER, 1895, BY SAMUEL WEBBER.

An examination of the detailed schedule of subjects submitted by the Council, as desirable topics on which to prepare papers for the current year, has induced the writer to offer the following notes on the first portion of the data requested by said schedule, which, it seems to him, it is desirable to preserve in such permanent form as will be given them by a place in the Transactions.

The first topics suggested, the storage of water supply and the cost of its development and maintenance, seem to belong more particularly to the civil than to the mechanical branch of the engineering profession; but as the utilization is mechanical, and the whole matter is intimately connected, it seems proper to offer a few general notes on the subject of the supply of water necessary for its mechanical utilization.

The engineers, who have been for many years engaged in the question of water-supply for large cities, have laid it down as an established fact that, by means of proper and complete storage basins, one-half the annual rainfall may be thus saved, the other half being either absorbed by vegetation or dissipated by evaporation.

This amount has been usually estimated for our Northern cities as 1,000,000 gallons per day from each squarge mile of drainage area, or one-half an annual rainfall of 42 inches, which is a fair average for the larger part of the United States, east of Kansas and Nebraska, rising, according to Blodgett, as high as 50 and 55 inches in parts of the Southwestern States, but a safe estimate for the area of drainages from the great Appalachian range, which is as wide an area as we propose to consider in this paper.

It will be readily seen that this annual rainfall of 42 inches amounts to nearly 732,000,000 gallons on a square mile, so that 1,000,000 gallons per day is almost exactly half of it. To secure this half, however, requires the most complete and perfect system of storage basins possible, and it is not safe to calculate on such an amount as being available for water power by any possible and economical means of storage.

It is possible, however, by practicable means of storage, to secure about one-third of the rainfall, and as water for power purposes is usually measured in cubic feet per minute, or per second, instead of gallons, we will now adopt that mode of computation.

An annual rainfall of 42 inches is equal to 267,409 cubic feet per day on a square mile, or 3.09 cubic feet per second, and if we take one-third of this, or one cubic foot per second, from each square mile of drainage area, we arrive at the supply which can usually, by the aid of storage, be relied upon.

The late James B. Francis, for many years the engineer of the Locks and Canals Company, at Lowell, on the Merrimac River, once gave me the following data, as the result of many years' observation of the flow of the Merrimac River, which, however, does not take in the few days of "spring freshets," when the snow is going off from the mountains, and the river so high and swollen as to be practically unmeasurable:

Spring flow, 90 cubic feet per minute per square mile.

"June flow," about the average, 55 cubic feet per minute per square mile.

Minimum flow in August and September, 30 cubic feet per minute per square mile.

The minimum flow has, however, been less than that once or twice in recent years, as, in 1881, it was only 26.7 cubic feet per square mile drainage area, or .445 cubic feet per second. This diminution has been due to the destruction of the forests around the head-waters of the river, and such forest destruction must be borne in mind by every engineer as a probability, when making estimates on a projected water-power.

It will be seen that this 30 cubic feet per minute, or 0.50 cubic feet per second, the minimum flow, is but one-sixth of the rainfall, and in order to secure the one-third, which I have considered as available, a sufficient "pondage" must be secured above the dam, at the proposed water-power or in some other convenient location, to store the night flow, if the water is used in the daytime, or *vice versa*, so as to get a double quantity during working hours without too much diminution of the working-head.

This is practically accomplished at Lowell, where the observations on the water-power of the Merrimac River have been longer continued and are more complete than any others of which I am aware by the pond made by the dam. This pond is 18 miles long, with an average width of 500 feet. The drainage area of the Merrimac, above Lowell, is 4,093 square miles, and if we take the minimum flow as 0.50 cubic feet per second, we have a total flow of 2,000 cubic feet per second.

Col. James Francis, who has succeeded his father as agent and engineer of the Locks and Canals Company, informs me that, with three feet of "flash boards" on the dam, giving a fall of 34 feet, they can store in this pond, at a depth of 1.50 feet, 71,874,000 cubic feet of water, which, if drawn down the 18 inches in 10 hours, would give them 6,165 horse-power, which, added to the daily flow of the same 2,000 cubic feet, would give at low water a total of 12,330 horse-power. The original estimate of the power available at Lowell was 10,000 horse-power on 30-foot fall; but by raising the dam above, and removing obstructions below this power has been increased as shown.

The net effect of the present turbines in Lowell is here taken at 80 per cent. There are, however, in place at Lowell turbines enough to utilize 20,000 horse-power, for which water is furnished for a portion of the year, but which have to be supplemented by steam engines, to supply the deficiency, when the water is reduced to the minimum flow, as above quoted.

In addition to this, the mills at Lowell, Lawrence and Manchester, N. H., have also derived great benefit from the use of the water stored in Lakes Winnepesaukee and Winnesquam, in New Hampshire, where the outlets were deepened, and weirs and gates put in below, enabling the water-power companies to draw down these lakes in the summer to a depth of 12 feet below the full height in spring, or six feet below their normal summer level. The area of these lakes above the Lake Company's dam is 71.8 square miles; and Colonel Francis gives me the following data of the amount of water furnished by them for several consecutive years:

Year.	Horse-power furnished for three months.	Depth drawn at lake
1878....	659.....	4.20 feet.
1879....	809.....	5.16 "
1880....	1,299.....	8.28 "
1881....	1,600.....	10.20 "
1882....	1,506.....	9.60 "
1883....	282.....	1.80 "
1884....	1,845.....	11.76 "
1885....	69.....	0.44 "
1886....	1,067.....	6.80 "
1887....	0.....	0. "

The variation in seasons is seen to be considerable.

Leaving this branch of the subject, with the repetition of the statement that, by storage, one-third of the rainfall can be relied on for power for day or night, I now take up the question of turbines.

The modern turbine is the evolution of ages from two distinct types, one of which delivers the water in a tangential direction to radial arms or vanes, projecting from a central shaft, without confining it in any way; the other conveyed it in a closed tube to hollow radial arms, through which it passed, and leaving them in a tangential direction, gave, by the reaction pressure, a rotary motion to the whole appartus.

We can trace both systems back to such remote antiquity that it is useless to attempt to find the origin; and as the principle developments of both have been made within the present century, we need go back no farther. As we shall devote much less time to the second of these types, or the "outward discharge," we shall consider it first, and simply refer to the well-known "Barker Mill," or the "Whitelaw & Sterret," sometimes called the "Archimedian" wheel, as the first modern type of this style.

In 1827 Mr. Forneyron applied this principle of the outward discharge from a pipe to a wheel with curved buckets placed outside of the apertures of discharge, so as to receive the water in a direction perpendicular to the first and inner element of the curve, which appears to be practically cycloidal, and which, revolving from the action of the water, finally discharged it at its outer element at the circumference, with its force exhausted; *i. e.*, the best results obtained from this form of turbine were shown by Mr. Francis, in his "Hydraulic Experiments," to be when the circumference of the wheel at the point of discharge had reached the velocity due to the water under the fall, or 62 per cent of the theoretical velocity due the head, from the action of gravity, this being the result of what is known as the "contracted vein." At this velocity of the wheel the water falls away dead into the pit, to take a new direction due to the fall in the "tail-race."

In the Fourneyron turbine the tube, or feeder, which supplied the water, was closed at the bottom by a concave cone surrounding the wheel shaft, which passed up through it in a pipe and was not exposed to the water. This cone was surrounded by a number of guide plates, curved like the buckets, but in the opposite direction, and fastened to the cone; and these delivered the water to the buckets in the proper tangential direction. This first turbine of 1827 was followed by another, in 1834, of seven or eight horse-power, which worked at times under a head of only nine inches.

Then came several others, under higher heads, of 63, 79, 126 and 144 feet respectively, giving from 71 to 87 per cent net effect of the power of the water.

In 1837 came the celebrated one of St. Blasien, 20 inches in diameter, weighing 105 pounds, under a head of 72 feet, and this was followed by one of 13 inches diameter, under a head of 354 feet. The width of this wheel across the buckets was only 0.225 inches, and it made 2,200 to 2,300 revolutions per minute. It is said to have driven 8,000 cotton spindles, with the other accessory machinery, which would require from 100 to 120 horse-power, and to have given from 80 to 85 per cent net effect. The apertures of the buckets were so small, however, that the water was all filtered before entering the feeder, to avoid clogging them.

The success of these wheels led to their introduction to this country by the late Uriah A. Boyden, who placed the first ones in Lowell, in 1844, and these were rapidly followed by others, until their use became almost general in the large manufacturing towns of New England. Those built under Mr. Boyden's instructions gave as high as 80 per cent net effect, and he claimed to have got 88 per cent at the Atlantic mills in Lawrence.

Their manufacture was taken up by a number of builders, but they did not all obtain such high results, and owing to the multitude of buckets, with the small apertures, they were liable to become choked by chips and leaves and other floating obstructions, not to speak of fish; for at Fall River the first turbines are said to have been stopped by eels, on their annual migrations to the sea, from Watuppa Lake.

The net effect at partial gate was also very poor, owing to cutting off the water by the sharp edge of a cylinder, as shown by the writer in a paper presented to this society, and included in Volume III of the Transactions.*

Attempts have been made to obviate this by introducing diaphragms in the buckets, so that only a part of the bucket is affected by this sharp cut-off, and this is shown in the Swiss turbines, now being introduced at Niagara Falls, but this division only reduces the dimensions of the apertures, and renders them more liable to choke from obstructions. This form of wheel, as built by Mr. Boyden, was also enormously expensive, and they have generally given place, as they wore out in 40 or more years' use, to the "inward and downward flow" turbine, which we shall now proceed to trace. This, as we said in the outset, comes from the old "flutter wheel" of radial vanes inserted in a central shaft, which supported a grindstone, or "millstone," on top of it, and which is one of the earliest traces of mechanical application of force to be found in history. India, Egypt, Syria and Europe all appear to have used this primitive water-wheel to grind their corn. It is impossible to determine when the modifications of this form began, but, in 1804, a patent signed by Thomas Jefferson was granted to Benjamin Tyler, of Lebanon, N. H., for "an improvement in water-wheels," in which he claimed "hooping the wheel with iron hoops," and specified the proper angle at which to set the buckets, "made of winding timber."

(To be concluded.)

That's the Way It Generally Seems.

"Our business is increasing greatly since the new catalogue, and shall I say the announcement of its advent in the ELECTRICAL REVIEW is the cause? Well, so it seems."

The above, from the president of the Metropolitan Electric Company, of Chicago, is one of those straws which show the way the wind blows with increased business.

* Efficiency of Turbines as Effected by Form of Gate. Vol. III, p. 84, No. 61.

TELEPHONE NEWS AND COMMENT.

A recent fire in the Phœnix telephone exchange at Altoona, Pa., did $300 damage.

Gettysburg, Pa., citizens are making a strong effort to get a new telephone system.

The Southern Michigan Telephone Company has completed its line from Vicksburg to Schoolcraft, Mich.

A part of the new underground wire system of the Baltimore, Md., police department is now in service.

The American Electric Telephone Company, of Kokomo, Ind., has the contract to install a new telephone system at York, Pa.

A telephone line to connect Colchester and Fandon, Ill., is under construction. John E. Hall, of Colchester, is one of the principal promoters of the scheme.

Mr. John A. McCrossan, manager and electrician of the Citizens' Telephone and Electric Company, of Rat Portage, Ontario, has been elected to full membership in the American Institute of Electrical Engineers.

The Philadelphia Council's electrical committee opened bids on December 16 for police telephones for 1896. There was but one bid—that from the Philadelphia Bell Telephone Company. The bid was the same as last year—$10 for full sets and $5 for single sets.

The Bell Telephone Company, of Buffalo, N. Y., pays its exchange operators from $35 to $50 a month each, depending on the length of time they have been in the company's employ. They have 28 days' vacation with pay each year and a holiday every other Sunday.

The gross earnings of the Erie Telegraph and Telephone Company's sub-companies increased in October $6,508 over the same month last year. Net earnings increase $2,227. Net increase 10 months of 1895 over same period 1894 was $38,786. Net increase of subscribers in 10 months 2,148.

President Morris F. Tyler, of the Southern New England Telephone Company, said in a recent interview: "We furnish house telephones for $3 per month and the price was formerly $50 per year. When a special wire is given a house the price is now $48 per year and it was formerly $65 per year. For business houses the price is $72 per year as against $120 formerly. So there is quite a reduction in price. I understand that one of the managers of the new company which proposes to locate in New Haven and also in Bridgeport has stated to customers that their telephones could be connected to our line. Now that, of course, cannot be done."

The proposed construction of a telegraph cable from the United States to Cuba was brought up anew in the Senate this session by a bill introduced on December 16 by Mr.

FIG. 1.—INTER-COMMUNICATING SET, AUTO-TELEPHONE SYSTEM.

Carter, which contemplates the building of such cable by a private corporation. The company is organized under the laws of New York, and asks for authority to lay its cable through the waters controlled by the United States and make a landing on the coast. It agrees to complete the work within two years, and asks, as an indirect subsidy from the government, a contract to carry any and all government messages at the rate of $25 per nautical mile per annum, without additional charges of any character.

The Buffalo, N. Y., *Times* relates the following incident as showing the discipline which prevails among

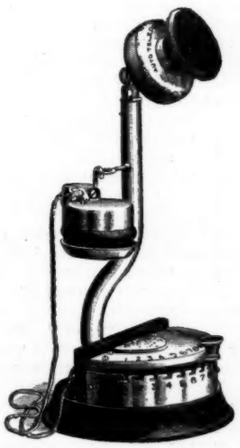


FIG. 2.—SELF-CONTAINED INTER-COMMUNICATING SET, AUTO-TELEPHONE SYSTEM.

the operators of the Bell Telephone Company of Buffalo:

A kind-hearted merchant said to Colonel Parker, the general manager of the company, "I want to engage a private secretary, and I want to engage the girl who answers the calls from my office. She is a remarkably courteous young lady and she never loses her temper."

"Who is she?" asked Colonel Parker.

"I don't know her name, but I could recognize her voice anywhere."

Colonel Parker made inquiries and learned that two different operators had been answering the merchant's telephone calls for the month and three girls for the month preceding. Each one of the girls had simply obeyed the company's rules and her own polite inclinations.

"But why do all their voices sound so much alike?" asked the merchant.

"They are trained to talk that way," replied Colonel Parker.

In a recent suit brought against the city of Baltimore, Md., by the Safety Insulated Wire and Cable Company, of New York city, it became of the greatest importance to have the wire company's charter in court. This phase of the case came up late one afternoon. Mr. Leonard F. Requa, general manager of the Safety company, was in court. He knew that the company's original charter was in the president's safe deposit box in New York and that the president was out of town. So there

FIG. 3.—AUTO-TELEPHONE TRANSMITTER AND RECEIVER SET.

was no hope of securing the original in time to be of any service. After a few minutes' reflection, Mr. Requa went to a long-distance telephone and called up the Secretary of State at Albany, N. Y., to whom he explained the importance of the situation. The Secretary of State agreed to mail to Baltimore as soon as possible a copy of the Safety company's charter. When Mr. Requa went down to breakfast in the hotel at Baltimore the following morning he found a copy of his company's charter in his mail. This incident simply goes to show that when there is quick work on hand a ready appreciation of the value of the telephone is a good thing to have with you.

An illustrated article setting forth the results of the latest studies and discoveries respecting "The Sun's Light," by Sir Robert Ball, who rivals the late Professor Proctor in his gift for popular exposition of astronomical subjects, will appear in *McClure's Magazine* for January. The publishers promise a series of articles by Sir Robert on popular astronomical topics during the coming year.

The Auto-Telephone System.

The Tucker Electrical Construction Company, 14 to 20 Whitehall street, New York city, are the exclusive manufacturers and sole licensees for the auto-telephone system illustrated and described herewith. This system is practically automatic in its operation, as only one hand is required in operating, leaving the other free for writing. The system is also very flexible and admits of complete intercommunication, each station being capable of calling any other station in the system, or any arrangement of calling or cutting out certain stations may be adjusted as desired. The auto-telephone system is especially adapted for use in hotels, apartment houses, office buildings and other public places which require a rapid means of inter-communication. The system is sold outright and at prices which have proved satisfactory to the purchaser.

The transmitter used is of the Hunnings type and was patented by the late Thomas McCoubray. Fig. 1 shows an inter-communicating set for 28 stations or more mounted as a wall set. It comprises an auto-telephone transmitter, receiver, signaling devices and a double-deck auto-telephone switch. This set can also be arranged as a "central," in a hotel or similar system.

Fig. 2 illustrates a self-contained inter-communicating set for 14 stations. It comprises a switch, transmitter, receiver and signal bell or buzzer, and can also be arranged for a system of 28 stations. It is supplied all ready to attach to cable and battery. It is a convenient form of telephone set for desk use and is finished in nickel, hard rubber and black or in any desired style to order. Fig. 3 shows an auto-telephone transmitter and receiver in a neat box form for use on private lines with a local battery.

Who Wants a Young Man?

TO THE EDITOR OF ELECTRICAL REVIEW:

I have been sending out a large number of applications to new electrical companies for a position such as engineer and dynamo tender, and, of course, like all young men who have no influence and are willing to give their whole time to certain subjects, it seems almost impossible for me get work in some power house; so I send you this letter, thinking that probably you may help me out.

I have had nearly three years' experience at machinery, during which time I had charge of two engines, and have been studying electricity for some time.

I relate this experience to you because, if you wish to help me along, as no doubt you know or hear of such vacant places, it will aid you in knowing whether or not I shall be able to fill some place.

If you cannot help me, what would you advise me to do? Thank you very much for a prompt reply. I remain,

Yours truly,
W. L. STEWART.
145 N. Mead street.
Wilkesbarre, Pa., December 10.

How the Victory for the Abendroth & Root Boiler Was Won.

In last week's ELECTRICAL REVIEW mention was made of the legal victory of the Abendroth & Root Manufacturing Company over the Edison Electric Light Company of Philadelphia. The matter in dispute was an installation of boilers made by the Abendroth & Root people in the Edison company's plant and which the Edison company claimed were defective and for which they sued the boiler company for $34,000. Abendroth & Root filed a countersuit for $6,830.99 for a balance due on payment for the boilers. When the case was tried the Abendroth & Root Manufacturing Company succeeded, first, in establishing the fact that they had lived up to every article of their agreement and had even done more than they agreed to do.

In the second place, they succeeded in establishing the fact that they had used the best material obtainable in the market. In this connection it is interesting to note that the greatest number of breaks occurring in these Edison boilers were reported to be in the item of bolts; and as it is a natural conclusion that the greatest breakage will occur at the weakest point, it was necessary to establish by evidence the fact that these bolts were equal, if not superior, to anything to be found in the market. When these bolts broke in almost every instance a curious phenomenon occurred. At the point of fracture, the metal, instead of being contracted to a smaller area than that of the bolt itself, retained the original size and area, showing no contraction whatever, but breaking sharply and squarely in a similar manner to a pipe-stem. This caused the question to be raised as to whether crystallization had occurred, and to determine this point many of these bolts were taken to a steam hammer and flattened out cold to less than one-quarter of an inch in thickness. In every instance the flattening was done without the slightest show of fracture running up into the body of the bolt, whereas, if crystallization had taken place at the point of rupture, the metal would necessarily show brittleness and breakage similar to the action of a piece of cast iron similarly treated. Another test applied to many of these bolts was to bend them double when cold, so that the two ends met, and this also proved the excellence of the quality of the bolts. In order to show that no effort had been spared to improve the quality of the material used, the Abendroth & Root Manufacturing Company had other bolts made of the best rivet iron, substituted in the place of the original ones, but all such bolts were fractured in identically the same manner, and a still further trial was made with steel bolts, which were effected with the same results. In order to make this breaking point test still stronger, three-quarter-inch bolts were substituted for the five-eighth-inch bolts, but with no better results. Beyond this, the shape of the head, and also the shape of the lug which received the head of the bolts, were changed in every conceivable way, but all to no avail, as the fracture of bolts continued in this almost unaccountable manner, whereas fracture in the other parts of the boiler was very infrequent, indeed. It follows that no better evidence could be furnished or was needed that good material was used throughout.

In the third place, to answer the allegation of bad workmanship, the Abendroth & Root Manufacturing Company, who have always been very jealous of their reputation, showed by means of photographs the tools which they now use in the manufacture of their boilers, and they proved that these same tools had been used in manufacturing all of the boilers supplied to the Philadelphia Edison company. As these tools are made to produce interchangeable parts, with cutters and other working details fixed immovably in the same position and adjusted to such positions by sets of templets carefully standardized, and, further, as the positions of the metal parts of the boilers were fixed from working points produced in the casting, it was found impossible for the plaintiff to show that such workmanship could be other than that produced in the many boilers manufactured by the Abendroth & Root Manufacturing Company. Moreover, as such trouble as was experienced in the Philadelphia Edison station has never been known in other plants, it stood to reason that, with workmanship and materials the same, all the troubles at the Edison station must have been due to local conditions existing in the plant itself. This same argument bore also on their fourth claim of bad design.

In the fifth place, the Abendroth & Root Manufacturing Company set themselves to turn the tables, and succeeded in proving that the accidents were due entirely to the unreasonable handling of the boilers by the Edison company, with the object of forcing these boilers far beyond their rated capacity, sometimes exceeding this rating by as much as 100 per cent and over. They also showed that the Edison company employed unskilled labor, and that these employés had instructions to keep steam up to the required pressure, irrespective of any demands that might be made on the boilers, and that the whole idea was to keep the lights going which the Edison company had contracted to supply, without regard to the personal safety of the attendants or capacity of the boilers.

One of the very important matters brought to light in this case, and acknowledged by the Edison company, was the use of extremely bad feed-water. It seems that the Edison company sunk a well beneath their station, and this was the only water they used to supply their station. This water, as was shown by the analysis presented during the trial, contained not a small amount of sewage, and ran 34 grains of impurities to the United States gallon, almost eight per cent of these impurities being proved to be sulphate of lime; while salt existed in appreciable quantities, and also a number of nitrates and ammoniacal salts. This water was what might be called the surface drainage of the city of Philadelphia, and as the city has unfortunately a very poor sewerage system, this drainage amounts to what might be regarded as sewer water which had undergone a certain amount of filtration in the earth down to the impervious strata along which it ran and finally collected in this well. In order to counteract the bad effects from this water, no small amount of chemicals was used. These were changed at times, and finally the Edison company seemed to settle down on the use of cutch, of what is more properly known in chemistry at Catechu, which contains a considerable quantity of tannic acid. In the storage tank located above the boilers large quantities of caustic soda were also put in the water, making so strong a solution that water dripping from it would take the hair off the horses that passed beneath it, also inflicting serious burns upon the workmen who were so unfortunate as to catch a sprinkle. The result of the use of this bad feed-water was naturally shown in the collection of a large amount of scale in the tubes, varying in thickness from five-sixteenths of an inch to one inch, and thereby closing down very materially the area of the tube opening. The chemicals used attacked the metal parts of the boiler and oozed through the joints thus attacked so as to form incrustations, which had at times almost entirely covered the bolts and bends. This incrustation proved so hard that the workmen were obliged to use a hammer and chisel to remove it. This state of affairs caused a rigidity of parts which were designed to be flexible, and it also caused the unnecessary burning out of many of the tubes.

Another very important point established by the evidence was that an excessive forced draft was used in order to drive the boilers to the unreasonable extent to which they were used, and evidence showed that this draft was sufficient at times to support a column of water from three to four inches in height.

Several well-known experts appeared in this case and accounted for the various troubles above enumerated. One of the most interesting points developed was the production of water hammer in the tubes of these boilers, which was explained in the following manner: It is a well-known fact that every pipe or tube has a definite capacity of discharge, and when this capacity is reached no more water or steam can be delivered through an opening of such an area; so that in case a larger discharge is required, a larger tube must be used. In driving these boilers to such an excessive extent, in the course of natural circulation the water and steam passed up along the inclined tubes to the front headers and there advanced upward into the overhead steam and water drums from which the steam was delivered to the piping system. When the circulation reached a point equal to the capacity of the tube, of course, no more steam or water could be discharged from that upper end of the tube, but as the heat still continued to be applied around the tube, more steam was generated, and, of course, the pressure of this steam in the tube forced the steam and water back down the tube until they reached the rear header, and here the steam suddenly had a chance to escape upward by the course of the rear headers to the overhead steam and water drums, and the colder feed and circulating water trying to enter the lower end of the tubes from these same rear headers came in contact with the steam thus seeking passage of escape. The result was a sudden condensing of the steam, which was followed by a rush of water into the vacuum at an exceedingly high velocity, and this water rushed along the tube at about this same velocity until it reached a bend at the end of the tubes. The result was a very sudden and powerful blow there, practically like that of a cannon ball, which caused the bolts to rupture in the manner above described, breaking them, in fact, so rapidly that a flow of the metal composing them at the point of rupture was impossible.

This flow necessarily would take a certain amount of time. The consequences of this sudden blow were exhibited in the breakage of these bolts without contraction of area at the point of rupture. It was remarked during the course of the trial that it was fortunate that these boilers were composed of small headers covered by small castings known as connecting bends, and that thus the damage done affected merely these small castings, producing these local results instead of rupturing large castings, which would, of course, be attended by far more serious ruptures. Glass models were shown at court which illustrated beautifully the theory thus presented, and in such a manner as to carry conviction to the minds of the court that this was the true theory of the disastrous occurrences. Other glass models illustrated the irresistible power of the water hammer, the force of which was sufficient to break the tubes, which held the water surrounded by a vacuum.

Reminiscences of W. E. Sawyer.

W. E. Sawyer, co-inventor with Albon Man, of the Sawyer-Man incandescent lamp, is referred to as follows in the Washington correspondence of the Chicago *Record:*

"He was at one time employed by Gen. B. F. Butler as a stenographer; again he was correspondent of the Boston *Traveler* and off and on worked at a telegraph key in the Western Union office in this city. He was expelled from the reporters' gallery for listening to the dispatches of his fellow correspondents when they were being sent over the wire and stealing the news they contained, and Uncle Isaac Bassett, the venerable doorkeeper of the United States Senate, once dragged him out of the attic of the Senate chamber, where he was trying to overhear the proceedings of an executive session. He was a short, thick-set, bandy-legged fellow, always seedy, ill-dressed and of a very nervous and excitable temperament. He had the inventive genius, but it was poorly developed, and his natural depravity led him to adopt and develop the ideas of others rather than his own. He invented what is known as auto-telegraphy—that is, the process of sending fac-similes of handwritings or drawings by wire, and sold the process to Captain Howgate, of the United States Signal Service, for $20,000. With this money he went to New York, set up a laboratory and advertised himself as an electrical engineer. He was intimate with Edison, and is supposed to have obtained an inkling of his experiments in using electricity for lighting purposes, for he appeared in Washington about the same time with an application for a patent for such a purpose. Man was the capitalist who furnished him money. As Sawyer was a spendthrift and a drunkard, he never enjoyed any advantage from his fraud, and went from bad to worse, until he shot a man in something like a panel game one night. For this he was tried and sentenced to imprisonment, but before they could take him to the penitentiary he committed suicide in his cell."

Sessions Foundry Company.

The Sessions Foundry Company has issued invitations to a large number of its friends to be present at the opening of its new works at Bristol, Conn., on Friday, December 27, between 9 A. M. and 5 P. M.

The Electric Railway at Youngstown, Ohio.

AN ELECTRIC COAL ROAD.

The electric railroad which is now being constructed in Youngstown, Ohio, by the Park & Falls Railroad Company, of that city, will be one of the most complete trolley lines for passenger and freight service in operation and the first electric road to handle freight in Ohio. The Lima coal fields, 15 miles from the city, which hitherto have been practically inaccessible, will be mined and the coal taken by 100 cars, constructed especially for the service, into Youngstown to the mills and for shipment. The company has a lease of this coal field, and as Lima coal is considered the best of all the Ohio product, the coal carrying is likely to prove a most successful feature for the new road.

The company has three franchises, one city and two county, and right of way on the projected bridge, which is to run from the center of the city to the high bluff across the river.

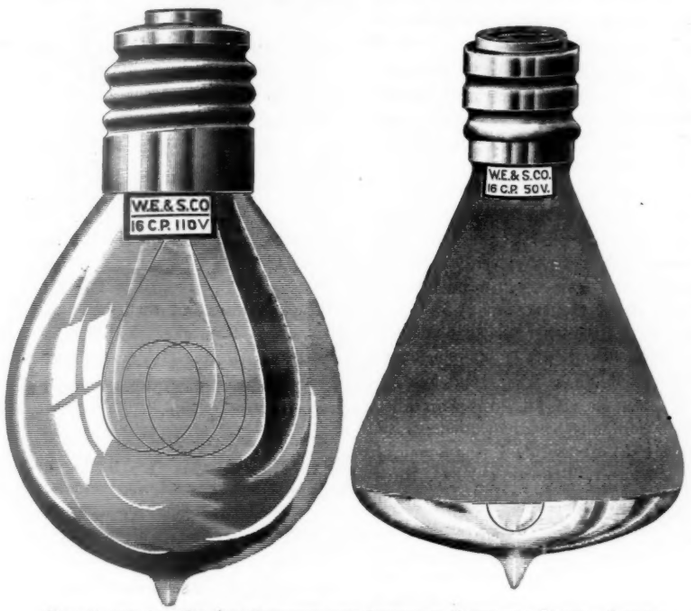
Reilly & McTighe, of 253 Broadway, New York, the contractors, have nearly completed that portion of three and one-half miles within the city limits, and this is to be in operation on December 23. Mr. Grant Hamilton, who, by the way, has been most active in the development of the plan, told a representative of the ELECTRICAL REVIEW that the suburban portion would be in operation for freight and passengers by June of next year.

Four 100-ton motors will be used for the coal hauling and a large power house will be equipped with 250 horse-power automatic cut-off engines and dynamos to suit.

The track will be the standard gauge, with T-rails and 68-pound girder rails in the city limits. In addition to the complete passenger and freight service, the company has a $1,500 mail contract.

American Institute of Electrical Engineers.

By direction of the Committee on Papers, Meetings and Editing, the meeting scheduled for December 18 was omitted. Due notice will be given, as usual, of the January meeting. Members are requested to notify the secretary at once of any recent change in address, as a new catalogue is in preparation to be printed in the December issue of the Transactions, and also incorporated in the bound volume for 1895.



FIGS. 1 AND 2.—WARREN ELECTRIC AND SPECIALTY COMPANY'S DOUBLE-COILED FILAMENT LAMP AND DESK LAMP.

At the meeting of the council on December 18, eleven associate members were elected and 10 associates were admitted to full membership.

The following committee was appointed by President Duncan to consider the question of incorporation of the Institute and any revision of the constitution that might be necessary to comply therewith: W. B. Vansize, chairman; Prof. H. S. Carhart, W. F. C. Hasson, A. S. Hibbard, Dr. Cary T. Hutchinson, T. C. Martin, Townsend Wolcott.

Telegraph Batteries.

TO THE EDITOR OF ELECTRICAL REVIEW:

Please give me the rule for supplying battery to telegraph circuits. What proportion should the voltage bear to the resistance of the circuit? And how should relays be wound to give the best magnetic effects, or at least a satisfactory degree of magnetism?

Yours truly,

SUBSCRIBER.

December 19, 1895.

West End Street Railway Company.

Last week the Boston *Journal* printed a report to the effect that there was a proposition afoot to reorganize the West End Street Railway Company combined with the Meigs system, and to put Mr. H. M. Whitney at the head of the combination.

Rats!

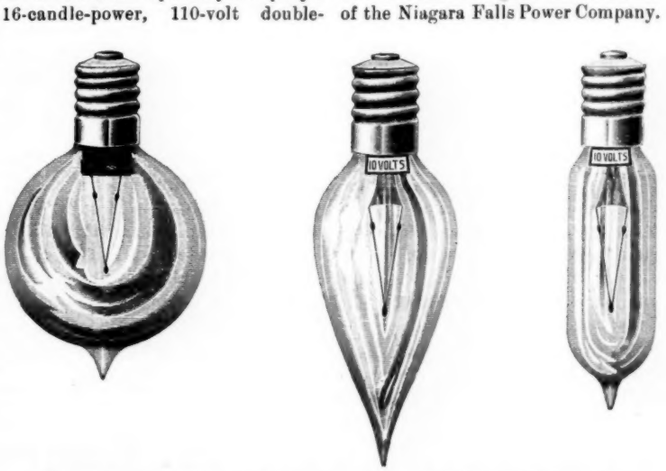
Warren Electric and Specialty Company's Incandescent Lamps.

The Warren Electric and Specialty Company, of Warren, Ohio, are manufacturers of an extensive line of incandescent lamps, several of which are illustrated herewith. This company was started about three years ago in a very small way, and its business has developed until at the present time its plant has a capacity of 6,000 lamps per day when pushed to the limit. A large part of the time the company has been compelled to operate its factory 24 hours per day. The officers of the company are C. B. Selby, vice-president; Elmer W. Gillmer, secretary and treasurer; F. E. Cavanaugh, superintendent. The management and officers of the company have always been the same, with the exception of a change of superintendents in the spring of 1895, at which time Mr. Cavanaugh became connected with the company.

Last week a representative of the ELECTRICAL REVIEW was shown through the company's factory by Mr. Gillmer, who expressed his opinion on the desirability of a universal incandescent lamp socket as follows:

"I think it would be of great benefit to all manufacturers if it might be arranged. It is unfortunate that there does not exist among manufacturers in this line any sense of that feeling of mutual dependence and protection which, in our case, would be particularly beneficial. This company has followed somewhat different methods from other companies, inasmuch as we make the best lamp we are able, sell at a fair price, give full value for the money, and the market appreciates it."

Referring to the accompanying illustrations, Fig. 1 shows the Warren Electric and Specialty Company's 16-candle-power, 110-volt double-coiled filament lamp mounted on an Edison base. This lamp is designed for use on electric railway cars or for decorative work, where it is necessary or more convenient to have the light in a small space. Fig. 2 shows a special desk lamp with frosted sides and clear bottom. It is also furnished with green sides and a clear bottom. This lamp gives a very pleasant lighting effect when suspended over a desk or work table. Figs. 3, 4 and 5 show some special shapes of miniature lamps furnished in any color and designed to burn in series on either high or low potential circuits. They run from 8 to 14 volts.



FIGS. 3, 4 AND 5.—WARREN ELECTRIC AND SPECIALTY COMPANY'S SPECIAL MINIATURE LAMPS.

The Electric Light Association, of Pennsylvania.

At a meeting of the executive committee of this association, held in Philadelphia, Pa., on December 4, 1895, Mr. John R. Wheeler was elected secretary to succeed Mr. C. A. Wolle, resigned. All communications intended for him should be addressed to 403 Grant street, Pittsburgh, Pa.

The secretary will, before the next annual meeting of the association, visit the various companies in the State with the view of effecting a more compact and vigorous organization of the electric light interests, the need of which, it is believed, is apparent to all concerned.

The annual meeting of the association has been postp ned from Wednesday, December 4, 1895, to Wednesday, April 1, 1896, at 2 o'clock, P. M., to be held at the Commonwealth Hotel, Harrisburg, Pa., and of which further notice will be given.

The officers of the association are: President, Robert E. Wright, Allentown; vice-president, Geo. H. Blaxter, Pittsburgh; secretary, John R. Wheeler, Pittsburgh; and treasurer, Robert D. McGonnigle, Pittsburgh. The executive committee is composed of P. B. Shaw, Williamsport; John A. Rigg, Reading; E. B. Sturges, Scranton; A. J. De Camp, Philadelphia, and Henry Clay, Philadelphia.

Mayor of Buffalo Signs the Niagara Falls Power Franchise.

Mayor Jewett, of Buffalo, N. Y., on December 16 signed the franchise of the Niagara Falls Power Company. He also wrote a short message to the Common Council, in which he said:

"I have this day approved the franchise adopted by the Common Council December 2d, 1895, providing for the introduction of electric power into the city of Buffalo. Inasmuch as the grant does not appear at any place in the official minutes in completed form, I respectfully recommend that it be ordered printed complete for future reference."

ADVANCE INFORMATION

Valuable News and Tips for Manufacturers and Dealers.

We publish below information relating to new electric railways, new electric light companies, new telephone companies and projected electric construction of all kinds. Every reader will find these columns of special interest, and manufacturers and supply houses will receive many valuable suggestions looking to new business by carefully watching this department in the ELECTRICAL REVIEW.

Electric Light and Power.

LOWELL, MO.—The Mayor may be addressed for information concerning construction of electric light plant.

EAST LIVERPOOL, OHIO.—McGhie & Moore are in the market for an electric light plant.

SHARON HILL, PA.—Electric lights are to be established here.

PENN YAN, N. Y.—Penn Yan Electric Light Company expect to have their new engine and boilers ready for business about January 27. The cost to the company is about $12,000.

GORHAM, N. H. — The Electric Light Company will soon extend its system to Berlin.

BROOKLYN, N. Y. — The Long Island Illuminating Company has been incorporated with a capital of $100,000. The directors are: Charles M. Lockwood, of Jamaica, and R. F. Rhodes, J. H. Holmes, Jay S. Jones and Eugene Seaman, of Brooklyn. The purpose of the company is to supply light and heat in the towns of Jamaica and Flatlands.

LYNDONVILLE, VT.—The electric light plant will be ready to start about the first of January.

ROME, GA. — The electric light plant has been sold for its taxes and was bid in by Captain N. H. Bass for $3,000.

SALEM, OHIO.—The consolidation of the Salem Electric and Power Company and the Salem Electric Railway Company has been consummated. The old bonds of the electric railway company will be taken up and a new issue made by the consolidated concern.

BOSTON, MASS.—The Block Plant Electric Light Company, a new corporation, has been authorized by the gas commissioners to issue $9,500 stock. The company petitioned for $15,000 stock, but the board deemed $9,500 reasonably requisite.

WALTHAM, MASS.—The board of aldermen of this place have under consideration at the present time a proposition to place the local electric and gas lighting plant in the control of the city. The price placed on the property by the management is $300,000.

BUCHANAN, MICH. — The water power, dam, equipment, franchises, etc., of the Buchanan Water Power and Electric Light Company will be sold January 17 next, that company having made a failure of its great project. The water power is derived from a dam 40 feet wide across the St. Joseph River at that place, a fall of 12 feet giving a power estimated at from 2,500 to 4,000 horse-power, the company having expended $125,000 on its power. It is thought that the Beckwith estate of Dowagiac will purchase the property of the old power company for about $85,000.

AVOCA, PA.—The Citizens' Avoca Light, Heat and Power Company has been incorporated; capital, $20,000. Directors, Isaac B. Felts, Taylor; B. E. Leonard, Geo. McDonald and Geo. W. Milnes, Scranton, and John S. McGroarty.

ASHLEY, PA.—Ashley Light, Heat and Power Company has been incorporated. Capital, $50,000.

HARRISBURG, PA.—Warrior Run Light, Heat and Power Company has been incorporated. Capital, $10,000.

WASHINGTON, D. C.—Samuel T. Howard and Anthony Hanlon, Jr., have filed an injunction against the District Commissioners and the Potomac Light and Power Company, asking that the commissioners be restrained from issuing a permit to the other defendants to construct any conduits along any streets in the city.

WORTHINGTON, MINN.—The new electric light plant is about completed and the lights have been turned on.

PERTH AMBOY, N. J.—The incandescent system of electric light is now being put in all the offices of the Lehigh, of this city.

PARRY SOUND, ONT.—Parry Sound Electric Light Company has been incorporated by W. H. Pratt, Toronto; W. M. Armstrong, S. Armstrong, John Galna, Wm. Beatty, T. S. Walton; capital stock, $200,000.

ELMHURST, ILL. — The Elmhurst Electric Light and Power Company has increased its capital stock from $15,000 to $30,000.

SEARCY, ARK.—M. G. Petty will purchase machinery for extending the electric light plant.

AYLMER, MICH.—George M. Winn, formerly of the Amherstburg *Leader*, has been granted a franchise to put in an electric light system at this place.

HERRINGTON, KAS.—A company has been organized to put in an electric light plant at this place.

ATHENS, MICH. — Rheubottom & Bond, of Union City, expect to put in electric light plant at this place this Winter.

WASHINGTON, D. C.—A permit has been issued by the commissioners to the Potomac Electric Light and Power Company that will enable that company to extend its lines across the District north of the Boundary, connecting its existing lines in Georgetown and Tennallytown with its lately acquired plant in Eckington.

FARMINGTON, ME.—The electric light plant has been shut down nearly two weeks and the town has been in partial darkness. The plant is now offered for sale.

NEWARK, N. J. — The People's Electric Light Company has been awarded a contract to furnish this city with 340 electric arc lights.

PHILADELPHIA, PA.—Address city clerk concerning erection of electric light plant.

GARDINER, ME.—The city clerk can give information concerning the establishment of an electric light plant.

NORTONVILLE, KAS.—The city has let contract for the construction of an electric light plant.

DAVENPORT, IOWA.—W. B. Joslin Electric Company have been awarded the contract for the gas and electric fixtures for the St. Marguerite's rectory; all to be of the latest design.

BROOKLYN, N. Y.—Henry Rowland, in charge of the electric light works at Bay Shore, is securing subscribers for the electric lighting, intending soon to buy the business from the present company and carry it on in his own name, if he can get enough subscribers to make a success of it.

BRONSON, MICH.—Bronson Electric Company has been incorporated by H. P. Mowry, J. S. Shonemen, J. F. Werner, Bronson; F. C. Rheubottom, Wm. H. Bond, of Union City; capital stock, $10,000.

GALENA, KAS.—The Galena Light and Power Company's plant has been purchased by Owen Ford, who represents a company of Ohio capitalists. The capacity of the plant will be increased sufficiently to furnish power for the operation of machinery throughout the mines. They expect to expend not less than $100,000 in the enterprise.

New Electric Railways.

MILL VALLEY, CAL.—Sidney B. Cushing is at the head of a company who will apply for articles of incorporation to build an electric road from Mill Valley to the top of Mount Tamalpais. The capital stock will be $150,000.

BALTIMORE, MD.—The City and Suburban Railway Company will put in two new engines of 2,400 horsepower.

BEATRICE, NEB. — Old-fashioned mule power has succeeded electricity as a motive power on the street railway.

BELMAR, N. J.—The new electric road which will run from this place to Point Pleasant, and will be known as the Asbury Park, Belmar, Spring Lake & Manasquan Division of the Atlantic Highlands, Red Bank & Long Branch Electric Railway, will start from the northern boundary at Belmar, and, after belting that town, will run through Como, Spring Lake, Willow Park, Seagirt, Manasquan and Brielle.

BOSTON, MASS.—The Natick Gas and Electric Company have petitioned for an additional issue of $5,000 mortgage bonds, for the purpose of extending its lines into Wellesley and Needham, to furnish domestic and commercial light and power.

LOS ANGELES, CAL. — The Los Angeles Electric Company is putting in new rails and completing its Ninth street line, which must be finished by January 1 in order to hold the franchise.

ST. LOUIS, MO.—Central Railway Company has been incorporated by Eugene Sweeney, Wm. S. Long and Albert Blair. Capital stock, $2,000.

PROVIDENCE, R. I.—A company of Philadelphia and Rhode Island capitalists have decided to build and operate an electric railroad from Providence to Taunton, Mass. Capital stock, $3,000.

MILLBRIDGE, ME. — The Cherryfield & Millbridge Street Railway Company has been incorporated by Samuel D. Leavitt, of Eastport; George A. Curran, of Calais, and George A. Murche, of Calais, and others, to connect Cherryfield with Millbridge. The length of the road will be five miles and it will be run by electricity. Capital stock, $30,000.

PENSACOLA, FLA.—Sterritt Tate and others are organizing a company to build a trolley line.

KINGSTON, N. Y.—The Colonial Electric Street Railway, which has been in the hands of receivers here for some months past, has been sold for $70,000 to Charles Stewart Davidson, of New York city.

TROY, N. Y.—The Troy City Railway Company will establish in a few days a contingency power station in the machine shop at the Albany Iron Works. A generator to be placed in the shop is expected soon.

COLUMBUS, OHIO. — The Akron Street Railway and Illuminating Company has been incorporated; capital stock, $1,500,000. Incorporators, J. B. Clews, J. A. Long, Ira M. Miller, F. A. Seiberling, E. C. Gibson.

UTICA, N. Y. — The Herkimer, Mohawk, Ilion & Frankfort Electric Railway is to place an incandescent dynamo in its power station for the purpose of furnishing incandescent lights to the villages along the line of the road.

New Telephone and Telegraph Companies.

SCOTTDALE, PA.—The Westmoreland Telephone Company is making arrangements to open a pay station at this place. The new line has been completed from Greensburg to Mt. Pleasant and Scottdale and will be extended to Connellsville and Uniontown.

PROVIDENCE, R. I.—The Providence Telephone Company has begun work on the new special lines for the police, fire and highway departments recently authorized by the City Council.

ALBANY, N. Y.—The Pacific Cable Company has been incorporated with a capital of $100,000 to run its own or leased wires from New York to California; thence under the Pacific Ocean to Japan, touching Hawaii

and other islands on the way; thence to the continent of Asia and islands adjacent thereto, including the islands of Australasia. The directors are: Edmund L. Bayliss, H. L. Leroy, C. D. Wetmore, G. A. Mills, Montclair, N. J.; J. M. Robertson and W. H. T. Hughes, of New York, and F. H. Allen, Pelham Manor.

CLYDE, N. Y.—The Wayne Telephone and Telegraph Company has been incorporated, to connect Auburn, Geneva, Palmyra, Lyons, Clyde, Seneca Falls, Waterloo and numerous smaller places by telephone; capital, $5,000. Directors, S. E. Bishop, A. B. Bishop, George E. Brisbin, Derick Douglas, John H. Childs and Albert C. Lux, of Clyde, and E. W. Brown, of Palmyra.

MARLOW, VT.—There is a rumor that a telegraph line is soon to connect this place with Keene *via* Surry.

NEW CASTLE, IND.—New Castle Telephone Company has been incorporated; capital stock, $4,500. Directors, E. B. Phillips, C. S. Hernly, E. N. Bundy.

AUGUSTA, ME.—A gang of men is at work in this place stringing wires for the Postal Telegraph Company. The new wires extend from Portland to Vanceboro.

LENOX, MASS.—The Postal Telegraph company plan to extend its lines from this place to Stock Bridge in the Spring.

BALTIMORE, MD.—The Southern States Telephone Company has been incorporated; capital, $100,000. The company will operate under its charter in this and other States, and is said to control some valuable patents and municipal franchises.

New Manufacturing Companies.

BOSTON, MASS.—National Electric Carbon Manufacturing Company has been incorporated with William A. Holmes, president, Boston; Charles F. Clark, treasurer. Capital stock, $500,000.

BALTIMORE, MD.—Maryland Manufacturing and Construction Company has been incorporated by S. D. Warfield, H. B. Keyser, Abraham I. Weinberg, Chas. T. Jenkins and others, to manufacture machinery and electric apparatus. Capital stock, $100,000.

NEW ORLEANS, LA.—New Orleans Edison Company has been incorporated by J. P. Ord, R. T. Paine, R. T. McDonald, W. T. Hardie, Wm. P. Nicholls, to operate electrical plants and works, including electric railways. Capital stock, $3,000,000.

CHRISMAN, ILL.—Schance & Fair Electric Company has been incorporated; capital stock, $6,000; incorporators, George W. Fair, John G. Schance, Byron Ash and James Hoult.

Business Troubles.

NEW HAVEN, CONN.—The Portland Electric Company is insolvent. Oliver Gildersleeve has been appointed trustee.

MILWAUKEE, WIS.—W. H. Bennett has been appointed receiver of the West Side street railway.

NEW YORK CITY.—The Cross Engine Company, of 126 Liberty street, is in the hands of the Sheriff, on attachments aggregating $1,719, in favor of Gustav Tacker. The attachments were obtained on the ground that it is a foreign corporation, and it is said that the company may be reorganized under New York State laws. Oscar Vezin is the manager of the company.

Increase of Capital Stock.

DES MOINES, IA.—The American Electrical Company filed amended articles of incorporation, increasing the authorized capital stock to $2,000,000.

TORONTO, ONT.—Toronto Electric Light Company has increased its capital stock from $500,000 to $700,000.

EVANSTON, ILL. — The Northwestern Gas Light and Coke Company has increased its capital stock from $250,000 to $500,000.

Taking Water From Niagara Falls.

The Commissioners of the State Reservation at Niagara held a meeting in New York city last week, at which the president, Andrew H. Green, presented a statement containing several points of interest to electrical people. Mr. Green's ideas were expressed in part as follows:

The great increase of projects to take water from the Niagara River that have already received legislative sanction, added to enterprises to utilize the more distant waters of the lakes, which waters are essential to the integrity of the falls, has become the occasion of a general apprehension that the spectacle of the falls is likely to be impaired. The following-named companies now claim rights to take water from the Niagara River above the falls without any limit of quantity and without any compensation for it:

1. Lockport Water and Electric Company; capital, $10,000,000.

2. Niagara County Irrigation and Water Supply Company.

3. The Lewiston Water Supply Company; capital not to exceed $50,000,000.

4. The Buffalo & Niagara Power and Drainage Company.

5. Niagara Power and Development Company.

6. The Niagara, Lockport & Ontario Power Company; capital not to exceed $10,000,000.

Besides these, the following companies now actually draw water from the river without paying one dollar to the State:

First—"The Niagara Falls Power Company," originally chartered as the "Niagara River Hydraulic Tunnel and Sewer Company," claiming the most monstrous powers under a remarkable series of legislative amending acts strewn through a series of years. * * *

Second—"The Niagara Falls Hydraulic Power and Manufacturing Company," which now takes water from the river, is engaged, without the slightest authority, in enlarging its canal, so that its flow capacity will be 462,000 cubic feet per minute. It pays nothing to the State. * * *

Mr. Green then laid before the commissioners the opinion of Attorney-General Hancock to the effect that this latter company is taking water without authority, and concluded as follows:

While these corporations are taking the property of the State for nothing and are threatening its existence, it is to be remembered that, looking at it merely in a financial view, if we can descend to that, visitors at the falls contribute to the industries of the State, its stores, its railroads, its hotels, a volume of money much larger than will accrue from all the corporations that have been or ever will be established at the falls, and the locality itself reaps vast harvests from these sources.

The following propositions now present themselves for your consideration:

First—What measures, in view of the Attorney-General's opinion, is it now proper to request him to adopt with respect to the Niagara Falls Hydraulic Power and Manufacturing Company now taking water without authority?

Second—Will the commissioners request the Attorney-General to examine the statutes under which the Niagara Falls Power Company is now taking water to see whether they are constitutional, and whether they should not be repealed in whole or in part by reason of the unparalleled and unpaid-for advantages that they purport to grant?

Third—Shall we, in the interest of the State, ask the legislature to repeal all other charters or rights purported to be given to other companies which do not now take water, except so far as it is to be taken merely for domestic or sanitary purposes, and to be returned to the river above the falls?

Fourth—Shall we insist that wherever water is taken it shall be at a fair compensation to the State, and that it shall be taken only where it is to be returned to the river above the falls, or upon what other considerations?

Peck Electrical Company.

Mr. E. F. Peck, vice-president of the National Electric Light Association, who for the last ten years has been the general superintendent of the Citizens' Electric Illuminating Company, of Brooklyn, N. Y., has formed a company, to be known as the Peck Electrical Company, with an office at 15 Cortlandt street, New York. The company proposes to manufacture and deal in electrical specialties and supplies and also to engage in electrical engineering in all its branches. Mr. Peck's long and practical experience as superintendent of one of the largest and most successful electric lighting plants in the country, together with his recognized capacity as an electrical engineer, will undoubtedly command for the company a large share of public and private patronage.

KIND WORDS.

GOOD THING—PUSH IT ALONG.

TO THE EDITOR OF ELECTRICAL REVIEW:

I am a subscriber to several electrical papers. I like the ELECTRICAL REVIEW best. Enclosed find draft. Push it along every week until 1897. With best wishes, I am

Yours very truly,

H. E. J.

Illinois, December 15.

FOR SALE.

Cheap for cash. Good electrical supply and construction business in live Southern city. Good reasons for selling. Address "SOUTHERN," Care of ELECTRICAL REVIEW, 13 PARK ROW, NEW YORK.

MESCO DRY BATTERY.

A standard battery for all open circuit or intermittent work. Highly recommended for Telephone Transmitters.

OVER 230,000 SOLD DURING THE PAST YEAR.

For sale by nearly all the Electrical Supply Houses in the United States.

GIVE IT A SEVERE TEST. Unreliable Dry Batteries are not sold much cheaper than the MESCO.

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WEATHER-PROOF TRADE MARK "O.K." LINE AND HOUSE WIRES

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ELECTRICAL ENGINEERING CO. MINNEAPOLIS, MINN.

ST. LOUIS ELECT'L SUPPLY CO., ST. LOUIS, MO.

BRADFORD BELTING CO., CINCINNATI, O.

PHILLIPS INSULATED WIRE CO.,
NEW YORK OFFICE: 39 & 41 Cortlandt Street.
FACTORY: PAWTUCKET, R. I.

ELECTRICAL PATENTS

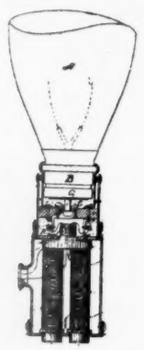
ISSUED DECEMBER 17, 1895.

551,357 Incandescent electric lamp; C. A. Beal, Abington, Mass.—A socket for a double or single filament lamp, having a central contact piece and two side contact pieces, insulated from each other and occupying the same concentric circle around the central contact piece.

551,358 Universal clamp; A. O. Benecke, Newark, N. J.

551,361 Apparatus for manufacturing white lead by electrolysis; A. B. Browne, Cambridge, Mass.

551,364 Magnetic electric lamp holder;



No. 551,364.—MAGNETIC LAMP HOLDER.

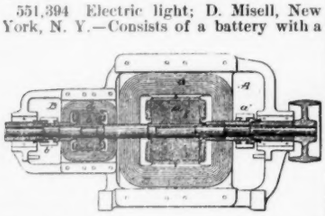
M. H. Collom, Denver, Colo.—Consists of a lamp and socket and a magnet having exposed magnetic pole surfaces.

551,371 Means for operating and regulating speed of electric motors; R. Eickemeyer, Yonkers, N. Y.—Consists of an electric motor, provided with a governing field coil, a governing dynamo driven by the motor and a switch for controlling the line current connections with the motor and with the dynamo, and also controlliag the delivery of current generated by the dynamo to the governing field coil of the motor.

551,372 Electric program clock; F. Frick, Waynesborough, Pa. — A program disk provided with perforations, a spring contact pin adapted to engage with the said perforations and consisting of a metallic strip bent double, one end of the said strip being inclined.

551,391 Automatic telephone exchange system; W. F. Lounsbury, Owego, N. Y.

551,394 Electric light; D. Misell, New York, N. Y.—Consists of a battery with a



No. 551,371.—EICKEMEYER'S MEANS FOR OPERATING AND REGULATING SPEED OF ELECTRIC MOTORS.

frame mounted thereon, a revoluble toothed barrel hung in the frame and having an upwardly projecting spindle, radial arms connected to said spindle, a reed plate engaged by the barrel, an incandescent filament supported above the spindle and having a downwardly extending contact wire that is adapted to be engaged by the radial arms, and with battery wires going to the filament and to the spindle.

551,427 Heat regulator; W. W. Wilcox, Westerly, R. I. — Consists of a movable receptacle for liquid operatively connected to a heat-controlling valve or damper, a liquid supply for said receptacle, thermostatic means for controlling the flow of liquid into said receptacle and distinct thermostatic means for controlling the escape of liquid from said vessel.

551,436 Electric meter; T. Duncan, Fort Wayne, Ind.—Consists of an electric meter, a vertical spindle carrying an armature and retarding fans, a vertical post adjustable in its bearings and having a jewel setting in a removable or separable part at its upper end, upon which the said spindle rotates, and a cup-shaped nut covering said jewel and adjustable upon the said vertical post.

551,451 Electric lighter; H. E. Rider, New York, N. Y.

551,461 Art of producing carbide of calcium; W. C. Clarke, New York, N. Y.

551,470 Controlling electric motors; D. Mason, Schenectady, N. Y.

551,534 551,535 551,536 551,537 Closed conduit electric railway system; F. C. Esmond, Brooklyn, N. Y.—Consists of an insulated supply conductor, working conductor sections, switches and magnets for operating the switches, with a double set of overlapping collectors leading to the motor, and a switch for including a resistance in the circuit between the motor and the rear set of collectors in either direction of motion of the car.

551,565 Process of renovating storage batteries; J. Trowbridge, Cambridge, Mass.—Consists in charging the cell, removing the negative lead elements from the cell, replacing them by an amalgamated zinc element and then discharging the storage battery or accumulator.

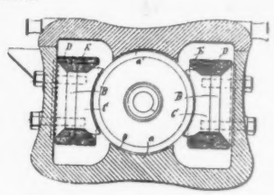
551,567 Electric motor; M. J. Wightman, Cleveland, Ohio.—Consists of a pole piece constructed in two sections, the rearward or outer section whereof is removable, whereby the inner section thereof is capable of being moved outwardly or backwardly from the armature.

551,587 Electric railway; R. M. Hunter, Philadelphia, Pa. — An electrically propelled vehicle with an electric motor made cylindrical and supported directly by the axle independent of and between the wheels, and a commutator and brushes for the field magnets and armature.

551,633 Electric motor. 551,634 Mechanism for admission and regulation of currents to motors. 551,635 Mechanism for admission of currents to motors and regulation of currents in same; F. E. Herdman, Winnetka, Ill.

551,648 Electrolytic process of obtaining precious metals; L. Pelatan, Paris, France.

551,664 Electric railway motor shield; I. F. Baker, Lynn, Mass.—A propelling electric motor sustained beneath the body of the car, and a protective pan or shield formed in jointed sections and sustained between the motor and the ground, and suitable fastening devices for detachably securing the free end of the pan in elevated position.



No. 551,567.—ELECTRIC MOTOR.

551,674 Telephone transmitter; Mechanicsburg, Pa.

551,683 Electric clock; P. Meyer, Newark, N. J.—Consists of the lock case, of a pivotal bolt head, independent latches adapted each to operate said bolt head and an electro-magnet, its armature and connections also adapted to operate said bolt head when said magnet is energized.

551,712 Dynamo-electric machine; A. B. Blackburn, Wolverhampton, England.

554,734 Transmission of electricity to moving cars; T. Nesom, Indianapolis, Ind.—Consists of a trough-shaped conduit holder, insulating material within said trough, a conduit made in sections with sides and top placed inverted within such insulating material, water-tight insulated joints between the sections of the conduit, and water-tight packing between the conduit holder.

551,743 System for regulating effective tension of electrical circuits; H. O. Breul, Berlin, Germany.

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